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BRITISH DENTAL JOURNAL

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ORIGINAL COMMUNICATIONS

DENS IN DENTE

By GÖSTA GUSTAFSON and STIG SUNDBERG

Historical Review

Dens in Dente is a malformation which, as is indicated by its name, gives the impression of being a secondary or accessory tooth enclosed in another tooth. The first detailed description of the phenomenon was published by Tomes in 1859. His exposition is so lucid and exhaustive as to warrant being quoted verbatim.

Fig. 1.—From Tomes' A System of Dental Surgery.

"The defective tooth (fig. 1), although not necessarily the subject of any very obvious deformity, is usually a little irregular in shape, and at some part slightly enlarged. The enamel investing the crown may be, and often is, perfectly well developed; but we shall find upon the crown a slight depression, in the centre of which is a small dark spot. If the tooth be divided through its long axis, it will be seen that the dark centre of the depression is in fact the choked-up orifice of a cavity situated within the substance of the tooth, external, however, and perfectly unconnected with the pulp-cavity. If the section be a fortunate one, we shall be able to trace the enamel as it is continued from the exterior of the tooth through the orifice into the cavity, the surface of which is lined more or less perfectly with this tissue. The layer of enamel which forms the surface of the cavity is, however, thinner, and less perfectly developed than that upon the surface of the tooth, and is in some cases covered here and there with a small amount of cementum."

Mühlreiter, who had seen Tomes' work, gives a clear description of some cases. He investigated 500 second maxillary incisors and found among them 14 with abnormal cavities within the tooth. The cavities were all situated at the lingual side and were lined with enamel, but enamel was missing at some places where channel-like fissures penetrated through the dentine.

Later investigators entirely disregarded Tomes' work until Kronfeld in 1934 drew attention to it. The malformation is very rare and owing to the difficulties in examining such specimens several of the descriptions are of very little use. A collected survey of the different cases and opinions is as yet lacking and we therefore include a discussion of the cases available in the literature.

The first authors (except Tomes and Mühlreiter) got the impression, when judging the appearance of these malformations, that it was a question of a product originating from two different tooth germs one of which had grown circularly around the other (Busch). Busch pointed out, however, that "in the outer tooth the enamel was turned outwards but in the inner inwards." He compared the relation of the two parts to "two fingers of a glove, one of which has been turned inside out and then stuck into the outer."

In 1918 several works on dens in dente were published, and among them that by Moral,[1] which clearly described the appearance and development of this phenomenon. He found, like Tomes and Mühlreiter before him, that there was an opening through the surface of the enamel into a cavity within the tooth and that this cavity must have originally been filled by the enamel-pulp organ. This enamel organ must have received nutrition from somewhere, the obvious passage being through the orifice in the lingual surface. The narrow space between the "inner" and the "outer" tooth was the original pulp. The enamel within the cavity was of poor quality and in certain places missing entirely. Moral also established conclusively that "the anomaly known as dens in dente is not a fusion of two teeth, but is only one tooth."

Most investigators[2] nowadays are of the same opinion as Moral but Wustrow maintains in addition that a complete isolation of the invaginated cavity takes place and that the cavity thus is not connected with the surface of the tooth.

The type of dens in dente here described is a defect of the crown alone. However, de Jonge Cohen has described a form of "dens in dente" where the defect is located in the root and consists in an invagination of the dental tissues from the mesial side of the lower premolar. Zerosi's case, too, a lower wisdom tooth, had malformation of the root only. These malformations of the root do not contain any enamel, nor is there any connection with a foramen cæcum. Broca (quoted from Tomes) called the first type "Odontomes coronaire" and the second "Odontomes radiculaires." These are clearly two different malformations and in our opinion the term "dens in dente" should be retained for the type described by Tomes and thus named by Busch. And, though the term as such is erroneous, it has been accepted for so long that it would be impractical to change it. It should not be applied to other malformations, however.

The type of malformation here discussed is always located in the front teeth in the upper jaw; as a rule it is found in the second incisor.[3] In this connection supernumerary teeth in the region of the first or second incisor are also very common.[4] The canine, too, may be involved[5] as well as the first incisor.[6] The cases of dens in dente described by some investigators as located in other teeth cannot be considered certain. The cases located in the lower jaw recorded by de Jonge Cohen are, as mentioned before, of an entirely different type. Euler quotes a case in a lower canine. It is not absolutely certain, however, whether this case is a typical dens in dente (presence of enamel cavity doubtful). Gombinski describes a fusion between a premolar and a molar in the lower jaw. Beust and Freerick's case is "a tooth-like enclosure in the greatly enlarged cavity of a lower second bicuspid." The authors themselves describe the case as due to "cleavage of a part of Hertwig's sheath rather than invagination of enamel epithelium," thus not counting it as a case of the ordinary dens in dente.

In all cases of a typical dens in dente it is clearly stated that foramen cæcum is the starting - point of the malformation and that the invagination here is connected with the external surface.[7] Wustrow suggests, however, as was mentioned above, that the invagination is isolated in the later stages. Rebel's case is seemingly a deviation, in so far as foramen cæcum is displaced incisally. This can, however, be observed in almost every case. In one of Hammer's cases the radiograph discloses the presence of an incisal channel which was not observed by Hammer himself.

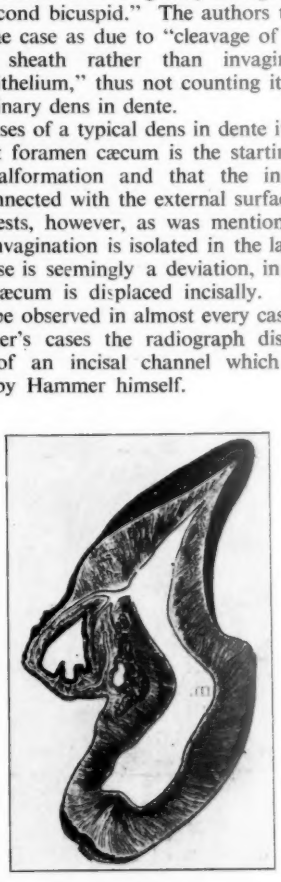

FIG. 2.—From Salter's Dental Surgery and Pathology, by kind permission of the publishers, Longmans, Green and Co., London.

In Salter's case (fig. 2) the invagination does not seem to have started from a foramen cæcum; it is possibly a case of another kind of invagination (trauma). In the tooth described by Miller there

[1] It is worth noticing that Moral's work is not quoted in the paper published by Euler in 1939.

[2] Boyd-Cooper, Bohn, Erausquin and Pelegrini and Ponte, Euler, Fischer, Kitchin, Jesensky, Kirk, Kronfeld, Moral, Peckert, Rebel and Rohmann, Thoma and Wustrow.

[3] Boyd-Cooper, Bohn, Fischer, Hammer, Jesensky, Kitchin, Kronfeld, Linderer, Mühlreiter, Rebel and Rohmann, Rushton, Swanson and McCarthy, Zilkens and Zilkens.

[4] Busch, Fischer, Jesensky and Moral.

[5] Baume, Gottardi, Gullifer, Hammer, Kirk, Miller, Rushton and Wustrow.

[6] Busch, Lejeune and MacDonald, Zilkens and Zilkens (two cases).

[7] Baume, Boyd-Cooper, Bohn, Fischer, Gottardi, Hoepfel, Jesensky, Kronfeld, Mühlreiter, Peckert, Rebel and Rohmann, Rushton, Swanson and McCarthy, Tomes and Wustrow.

are as many as fifteen invaginations in different places, and the tooth can therefore not be classified as belonging to the typical dens in dente. In Kirk's specimen the inner tooth is covered by enamel. If the drawing and the description of this case were correct, this would be the only case of a real dens in dente, that is two teeth, the one within the other. This does not, however, tally with Kirk's own opinion that the malformation is "an invagination of a portion of the dental follicle including some portion of the enamel organ."

It is particularly interesting that in a great number of cases an inflammation was observed in the tooth[1] accompanied by resorption of the bone round the apex.[2] This has led to extraction generally taking place at a very early age.[3] In no case could caries have been the cause of the inflammation. Bøhn is of the opinion that some pulp ramifications have been vital in spite of the changes in the jaw.

The discovery of the connection between the invaginated cavity and the pulp[4] explained the inflammations. The partial absence of enamel and the channels through the dentine had already been described by Mühlreiter. An explanation of the development of the connection was given by Moral who showed that the second apical foramen observed by Busch must have developed when the ameloblasts situated at the bottom of the cavity could no longer form enamel and consequently no dentine was formed, so that the cavity was separated from the pulp, and thus also from the interior of the jaw, by soft tissues only. There are thus two apical foramina.[5]

The connection of the cavity with the pulp is described by Kronfeld as "a fine canal and numerous smaller peripheral canaliculi leading from the bottom of the cavity in the crown into the pulp-chamber." Busch observed two foramina, but as he believed in two tooth germs being engaged, this seemed quite natural to him. Fischer, too, demonstrated a vascular canal leading from the pulp of the peg-shaped tooth to the soft tissue in the interior of the invagination. He assumed the connection to have developed through resorption. In his case the enamel at the bottom of the cavity is poorly developed. This condition was also noted in several teeth, reported by other observers.[6] Hoepfel also found a connection with the pulp and explained it as due to resorption and resulting in a great number of narrow canals. Fischer's tooth presents a wide canal from the invagination to the pulp. According to Hoepfel the reason why no enamel is deposited at the bottom is lack of nutrition in the closed cavity (this opinion is also held by Rushton). Hoepfel then suggests that connection with the pulp takes place through necrotisation of the dental epithelium.

Those investigators who performed more detailed histological examinations mentioned that the inner enamel was poorly developed and calcified. In the orifice Bøhn found a mass of necrotic tissue which he explained as being the remains of the enamel organ. Particles of food were also found to have been pressed into the cavity. In other cavities soft tissues and bone tissue were found.[7] In Hammer's case no remnants of enamel could be found but only irregular masses of bone and soft tissues.

According to Fischer the course of the dentinal tubes is more irregular at the orifice of the invagination. It can be observed that some force must have checked their original course. Otherwise the dentine in his case presents a normal appearance although it grows irregular towards the apex.

Kitchin found a greater number of lamellæ and tufts in the inner than in the outer enamel. The inner enamel "gives evidence of crowding and consequent pressure during development."

Bøhn is the only one to discuss at greater length the histological details; he demonstrated the fact that the enamel is comparatively normally calcified at the entrance orifice and that the prisms run radially in relation to the necrotic masses at the orifice. Towards the crown, on the other hand, the prisms turn up towards the outer enamel. Along the walls of the cavity the enamel loses its normal structure more and more. At the bottom of the cavity the formation of enamel has ceased entirely.

Bøhn describes the dentine as normal coronally both in the inner and the outer part whereas the apical portions show varying degrees of irregularities in the structure of the dentine, increasingly interwoven with resorption canals the nearer they come to the apex. The part of the inner formation nearest the apex has a singular shape—the deposit of dentine here lies just like the layers of an onion and forms a large oval body around a canal leading from the great cavity directly to the foramen.

Those investigators who are convinced that the defect starts from foramen cæcum maintain that it is a deepening of this foramen that has caused the malformation. Tomes described an intermediate stage with a greatly deepened foramen cæcum,

[1] Boyd-Cooper, Bohn, Gullifer, Hammer, Hoepfel, Kitchin, Kronfeld, Lejeune, Rebel and Rohmann, Swanson and McCarthy, Zilkens and Zilkens, and Wustrow.

[2] Bohn, Gullifer, Erausquin and Pelegrini and Ponte, Kitchin, Kronfeld, Lejeune, MacDonald, Rushton and Swanson, and McCarthy, Zilkens and Zilkens.

[3] Hoepfel 8 years, Rebel and Rohmann 8 years, Swanson and McCarthy 8 years, Gullifer 12 years, Lejeune 12 years, Boyd-Cooper 13 years, Kronfeld 15 years, Zilkens and Zilkens 15 years, Wustrow 15 years, Kitchin 16 years, Bohn 18 years, Zilkens and Zilkens 19 years, and Hoepfel 29 years.

[4] Bohn, Fischer, Hoepfel, Kitchin, Kronfeld, Moral and Rushton.

[5] Busch, Hoepfel, MacDonald and Moral.

[6] Hoepfel, Kitchin, Moral and Rushton.

[7] Kitchin and Kronfeld.

and this is also discussed by Hoepfel, who suggests that there is a transition from the slightly deepened foramen cæcum via dens in dente to more highly differentiated odontomata.

It has also been said that the deepening is due to the active downgrowth from the enamel organ towards the root (Moral). This opinion is not supported by Kronfeld, however, who, on the basis of Orban's investigations, maintains "that a dens in dente may develop not by actual ingrowth of enamel organ into underlying pulp, but by relative retardation in growth of a portion of the enamel organ; possibly at or near the lingual pit, while the surrounding dental tissues continue to expand to grow in a peripheral direction." Kitchin makes a similar assumption when he says "that such malformations represent retardations at one or more points of growth, resulting in invaginations of tooth tissues." Swanson and McCarthy say that this cannot be true, because, "if it were a retardation in the growth of a portion of the enamel organ, then the enamel of the inner tooth should end at the cemento-enamel line of the outer tooth. It must therefore be an active ingrowth of the cells of the enamel organ."

Various theories have been propounded to account for such invagination phenomena of the enamel pulp as those mentioned above. Römer considers them to be due to a healing process after a trauma occurring at an early age. In Gottardi's case a trauma at the age of 8 months resulting in a dens in dente in the lower canine could be demonstrated. Fischer suggests a trauma developing after an inflammation. Euler also discusses this mode of development and draws attention to Santoné's investigations with experimental traumata. In none of his cases, however, was there any new formation of enamel at the site of the trauma. As in Euler's opinion the development of enamel is not completely arrested he concludes that traumata cannot be the cause of dens in dente. This holds for Turner teeth, too, which are due to a lesion resulting from an infection. Euler therefore considers the theory of growth pressure discussed below as being a more likely explanation.

In Euler's opinion the growth pressure is thus the cause of the invagination of the enamel organ. A comparison with teeth found in ovarian cysts led Euler to side with investigators pointing to the resemblance between dens in dente and odontomata. Euler speaks of two types, the first being the one here considered as a typical dens in dente, and the other characterised by the great irregularity in structure and the lack of proportion between the outer and the inner enamel and the outer and the inner dentine; for the latter reason alone his second type is nearer to an odontoma.

The similarity of dens in dente to teeth from ovarian cysts was stressed by Kanamori, who in 1928 published a histological investigation of 50 ovarian cysts. The observations made in cases of ovarian cysts are similar to those respecting follicular cysts, where the pressure of the cysts may cause invaginations in the adjacent tooth germs.

The theory of the influence of growth pressure is also supported by the fact that most dens in dente occur precisely within the area where supernumerary teeth are found, the latter displaying the most complete transition from a deep foramen cæcum to the real invagination. The varying shapes of the crowns of supernumerary teeth are probably also nothing but the result of the influence of pressure from adjacent areas. Hoepfel and Fischer also find disturbed development in the middle jaw.

Rushton and Bøhn suggest that the increased growth pressure giving rise to the bulb shape of the cavity results from abnormal growth impulses contending against the normal form-shaping element of the tooth.

Without realising that his is a case of dens in dente, Gullifer calls the phenomenon a "gestant composite odontoma." He assumes that "epithelial cells may be separated from the sheath of Hertwig, and, as the root portion of the tooth grows, these epithelial cells are carried higher in the pulp." Gullifer also suggests that "a denticle is contained within the walls of a tooth."

The opinion suggested by Broca of dens in dente as an odontoma thus seems to gain increasing support from later authors. Rebel and Rohmann, however, maintain that dens in dente differs from an odontoma by presenting "eine gewisse sinnvolle dem Normalen angegelichene Anordnung."

Erausquin and Pelegrini and Ponte suggest that[1] "die Entstehung dieser Anomalie darauf zurückzuführen ist, dass ein einhöckriger, bzw, einwurzliger Zahn die atavistische Neigung hat, die Höcker bzw Wurzelzahl, zu vergrössern. Sie weisen ferner auf die Ähnlichkeit dieser Anomalie mit anderen durch Einstülpung von Gewebsteilen entstehenden Anomalien hin, wie sie die Odontoma, die Zwillingsbildung, die Schmelzperlen, die Molaren der Wiederkäuer, und kanallosen Zähne bestimmter Säugetiere sind."

Odontomata are treated in great detail by Rushton, who considers them to be caused by

"unco-ordinated and aggressive growth of part of the epithelium of a tooth germ, the rest of which is relatively normal. The abnormal epithelium invaginates the dentine papilla, carrying with it a core of connective tissue. The great diversity of form is due to the type of tooth, the relative rate and duration of

[1] "The origin of these anomalies is to be ascribed to those single cusped and single rooted teeth which have an atavistic tendency towards multiplication of cusps and roots. They show further that there is a similarity with other anomalies due to invagination of portions of tissues such as seen in the odontoma, geminations, enamel pearls, the molars of ruminants and those teeth in which the pulp canals have been obliterated in certain mammals."

growth and the part of epithelium which becomes abnormal."

Rushton, who does not use the term "dens in dente," speaks instead of "anterior tooth types, invaginated through the crown." The types described by Rushton resemble our Case 3 described below. A characteristic trait of all Rushton's cases is that there is a connection between the opening in the crown and the wide cavity in the interior of the tooth.

Rushton says:

"The development of the malformation begins in the enamel organ at about the time when dentine formation commences. Some cells near the centre of the deep surface of the enamel organ take on abnormal growth, proliferate in a deep direction at a great rate, and by their bulk invaginate the dentine papilla. . . . The epithelial cells of the proliferation have similar properties to those of the enamel organ . . . but grow with more vigour than the neighbouring tissues and compress them. The proliferation thus forms enamel and provokes the formation of dentine round its periphery except at first, or at all, on its deep surface. . . . The deposition of enamel and dentine on the outer walls of the tooth proceeds almost normally, but on the inner walls more irregularly. The growth of the invaginated process presses the incompletely calcified dentine walls and dentine papilla outwards so that they are thinned and the deeper part of the bony crypt becomes enlarged. The part already calcified cannot be expanded."

A survey of the literature thus shows that there are three possible modes of formation of dens in dente in its widest sense. There is first the type which has been described as an invagination of the tooth germ starting from the foramen cæcum. This type is quite unambiguous and can be referred back to the same principle, the only differences being variations in size. The second type is the one described by de Jonge Cohen in which an invagination of the root takes place so that an inner root is formed. In these cases there is no enamel, and the crown is not engaged in the defect. The assumption is that the defect here takes place within Hertwig's sheath. In the first type, the defect started in the enamel organ.

The third type is dubious and would, if it exists at all, be represented solely by Kirk's case. According to his description and drawing there was in fact, within the real tooth, another one with the enamel outwards. It is highly possible that Kirk's description and drawing are incorrect, but the possibility of such a formation cannot be definitely dismissed. If his description is correct this would be the only case of real dens in dente.

It would seem to be definitely proved that, in cases of dens in dente of the first type and of the type generally understood by this term, there is an invagination of epithelium from the foramen cæcum. The causative factor remains vague, however. The view that a trauma is usually the cause is probably eliminated by the fact that the defect always starts from the foramen cæcum. Santoné's work on experimental injuries and the picture of the effect of an injury shown by Björk indicate that an injury to the tooth germ causes a defect at the site of the injury. It does not seem very likely that all observed injuries would have been localised to the foramen cæcum only. No case of an injury outside the foramen has been reported. In Gottardi's case there is, however, a demonstrable injury which, it is highly probable, was the cause of the dens in dente. On the other hand, while this might prove that an injury may give rise to dens in dente, there is no proof that dens in dente is always caused in this way.

Most authors consider the dens in dente uncomplicated when it takes the form of a bulb growing down within the tooth. As mentioned before, Kronfeld regards the invagination as caused by a passive retardation. This appears to be very probable as he bases his opinion on the investigations of tooth growth carried out by Orban.

It is difficult to explain the communication between the invagination and the dental pulp. The theory that the communication is caused by resorption of the enamel and of the dentine is not in conformity with the figures. Moral's theory that, for some reason or other, neither enamel nor dentine are laid down seems correct but does not explain the retardation of the tissues around the canals.

The assumption, made by some authors, that deep foramina cæcum, dens in dente and odontomata only show quantitative differences, appears correct. It is, however, necessary to carry out further investigations regarding the changes in the dens in dente as compared with the changes seen in the odontomata.

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(*To be continued*)

DENTAL SEPSIS AND BACTERIAL ENDOCARDITIS

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That a largely preventable disease carrying a mortality rate of 50 per cent should still be permitted to occur is sufficient reason for once again bringing omissions in prophylactic therapy to the notice of the dental and medical professions. The fact that neither dentist, physician nor patient can be blamed solely for the occurrence of the disease is no excuse for permitting it to occur, nor is it any consolation to the sufferer who has only an equal chance of recovery or death. This disease which can frequently be prevented is subacute bacterial endocarditis. The method of prevention is simple and certain in its operation.

The close association of septic foci in the mouth and a bacterial infection of the heart valves had long been suspected (Horder, 1909–10; Thayer, 1926; Rushton, 1930). However, Okell and Elliot (1935) were the first to show that bacteria could be recovered from the blood stream following oral trauma. They demonstrated that during the extraction of carious teeth 75 per cent of persons could have organisms isolated from their blood stream, furthermore, 34 per cent of patients with no oral sepsis could be shown to have organisms in their blood immediately following extractions. That extractions were not necessary to permit the entrance of organisms to the blood stream was shown by Elliot (1939) who demonstrated a transient bacteræmia following the mere rocking of a tooth in its socket, or the crunching of a hard morsel in the presence of pyorrhœa.

The organism giving rise to the bacteræmia is the *Streptococcus viridans*, a normal commensal of the mouth. In the healthy person these organisms, on entering the blood stream and finding nowhere to lodge, are readily dealt with by the defence mechanisms of the body. Bacteræmia occurring in an individual who has rheumatic valvular disease or a congenital flaw is, however, a very significant event, as the organisms, having a predilection for the cardiac abnormality, secure a hold, multiply and give rise to the serious and often fatal disease of subacute bacterial endocarditis.

Dental operations or the presence of carious teeth are not the only source from which the organism enters the circulation, as the *Streptococcus viridans* is occasionally a commensal in other parts of the body. However, Christie (1948), analysing 269 cases of subacute bacterial endocarditis, stresses the importance of foci of infection in the mouth as the potential source of *Streptococcus viridans* bacteræmia; furthermore, Selbie (1949), enlarging on the work of Elliot, has proved by serological methods that the organisms of subacute bacterial endocarditis are almost invariably derived from the region of the mouth. Matthew and Gilchrist (1949), in their series of 40 cases of subacute bacterial endocarditis, elicited a history of dental extraction within

three months of the patient presenting with the disease, in 35 per cent of the cases. In 48 per cent of the sufferers there was oral sepsis.

One particular patient, in whom a septic socket remained unrecognised, had the infective process on the heart valve adequately controlled with penicillin, but invariably relapsed after cessation of treatment. She continued in this way—penicillin course, relapse, further penicillin course, relapse—for over a year. Throughout this time her life was in the balance as cases of bacterial endocarditis may develop cerebral emboli with a fatal outcome at any moment. In addition to the grave illness with its economic burdens and hardships over 130 million units of penicillin were required to be purchased by a self-sacrificing husband to keep her alive. The offending tooth was at last recognised and extracted, the fountain of supply of organisms to the blood and thence to her damaged heart valve was cut off and since then she has remained perfectly well ; still, of course, with a heart lesion but without a superadded infection.

In the pre-sulphonamide era the demonstration of bacteræmia associated with oral sepsis and dental extractions made the problem of the prevention of bacterial endocarditis only more acute, when the potential source of infection was recognised. It was also realised that the removal of the source subjected the patient to the additional risk of acquiring infection on the heart as the result of the operation. The position was nebulous and no doctrine was formulated for the approach to the problem of the patient with rheumatic heart disease who required dental attention. The availability of sulphonamide or penicillin, both of which are very lethal to the *Streptococcus viridans*, has clarified the problem and permitted a definite procedure to be adopted in the prophylaxis of this disease.

It will be seen from the foregoing that the strictest attention must be paid to the oral hygiene of a patient with rheumatic or congenital heart disease. Should any operative interference be necessary it must be a rule with no exception that the manipulation be carried out under sulphonamide or penicillin "cover." By this is meant for an adult 1 gramme of sulphonamide four-hourly on the day prior to dental treatment, the day of treatment and the subsequent two days ; or penicillin 50,000 units four-hourly for a similar span of days. With less inconvenience to the patient a preparation of penicillin having a prolonged action may be employed ; procaine penicillin, one injection of 300,000 units being given on each of the four days in question. By such means the viridans bacteræmia is forestalled and the organisms fail to reach the ever receptive abnormal heart valves, Budnitz (1942), Nothrop (1944).

There can be no dubiety either about the procedure to be adopted by a dentist when consulted about an established case of subacute bacterial endocarditis who presents dental sepsis. With the patient receiving the standard dosage of penicillin for the treatment of this condition, the dental therapy should be carried out immediately and energetically.

The dentist should not be under the impression that the rheumatic or congenital flaw will be clearly evident to the physician or that the patient will be aware that there is cardiac pathology. It is not the bedridden cardiac cripple or the obviously "blue" child or adult who following "uncovered" dental extraction develops a superadded infection. The person showing the minimum of cardiac damage is the more likely to provide a fertile soil for the organism. The latter propensity to attack the patient showing the least pathology and hence no cardiac symptoms is no doubt responsible for the high incidence of bacterial endocarditis following dental extractions, as the presence of the valvular or congenital lesion has often been unknown to the dentist, physician and patient, circumstances which do not permit of prophylactic measures being undertaken.

The foregoing is an account of the academic approach to the problem of the prophylaxis of a largely preventable disease. The practical difficulty lies in the unawareness of the dentist of the fact that a patient requiring dental attention has rheumatic or congenital heart disease. Lack of information from the physician is on occasions responsible. Rarely, the patient, aware of the existence of a heart lesion, sees no reason why he should inform the dentist of its presence ; frequently as has already been pointed out, the lesion is minimal and neither party is aware of its existence. The problem is therefore not readily solved, but improved liaison between physician and dentist will help considerably towards reducing the incidence of the disease. Simple interrogation by the dentist regarding a history of rheumatic fever, "growing pains," St. Vitus's dance and frequent sore throats will also serve to unfold any suspicion of underlying rheumatic heart disease. If there be any doubt as to the presence of a cardiac lesion then penicillin " cover," which it is stressed must be adequate in dosage and duration, should be employed. In addition to prophylaxis this measure is of value, as experience has shown that patients who have extractions performed during a course of penicillin "cover" are more comfortable post-operatively, their gums heal more quickly and their convalescence is shorter.

A potentially fatal disease, frequently initiated by a minor dental procedure, can therefore be prevented by a simple prophylactic measure.

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OCCLUSAL EQUILIBRATION OF THE NATURAL DENTITION[1]

BY S. CRIPPS, B.A., L.D.S.ENG.

ALTHOUGH progress in many branches of dentistry has been phenomenally rapid in the past thirty years, the recognition of certain essential practices, proven scientifically and clinically, lags sadly behind.

The field of periodontology is very slowly coming into its own. Gingival disease and disturbances of the supporting structures of the teeth are beginning to claim some attention from the dental profession. At the same time, the diagnosis and treatment of anomalies of the biting and masticating mechanism of the natural dentition of the adult interest the few rather than the many. The story of occlusion, the normal and the abnormal, has been competently reported in our literature by a number of men. They have described, with clarity and persuasion, the elimination or reduction of adverse occlusal forces, the production of a gliding articulation which induces a freedom of movement of the condyles in the glenoid fossæ as well as the occlusal and incisal surfaces of the teeth, the potentiality of increasing or controlling natural attrition and the encouragement of a normal mastication of food. Much has been done in an attempt to fire the enthusiasm of the general practitioner, but, unfortunately, the need for repetition and more extensive propagation is still great.

This is not an original paper, but a sincere endeavour to impress upon the profession the vital importance of occlusal equilibration. First and foremost, we must believe, not lightly but implicitly, that pathological occlusion plays a significant role in the ætiology of periodontal disease. This conviction, based on the clinical observations and research studies of reliable investigators, will be fortified by one's own experiences after attempting several simple cases. As Craddock quite correctly points out, "at least some improvement in periodontal disease can be secured without occlusal diagnosis and equilibration," but a careful survey of post-treatment results in a number of conditions will reveal a percentage of recurrence traceable to the occlusal factor that has been ignored.

A clinical experiment performed by the writer in 1944, during service with the Canadian Army Overseas, reaffirmed the findings of other workers in this field.

Twenty Canadian servicemen were chosen, who had varying degrees of periodontal involvement, and who also showed some occlusal derangement. All clinical signs and symptoms were noted. The *only* treatment which was accorded to these patients was a genuine effort to equilibrate their occlusions. After the required number of visits, these cases were reinspected. The results showed a spectacular cessation of gingival bleeding to contact and pressure tests in five out of twenty cases, and a marked diminution in nine others. The remaining six patients showed no change whatsoever. As a testimonial, the writer was assured by the majority of the patients that the grinding treatment had made mastication more efficient and comfortable. In the cases that had responded, the gingivæ had lost much of their puffiness and engorgement and a considerable improvement was evident.

Clinically, we must conclude that pathological occlusion was at least one ætiological factor in fourteen out of the twenty test cases.

How many times per week or per day do we see some of the more classical signs of traumatic occlusion? For example, the typical traumatic crescent—a raised band of tissue around the neck of one or two teeth; or an area of gingival recession about the neck of a maxillary canine, which cannot be explained away as being the result of an improper brushing habit. Invariably, a rapid examination of the occlusion will disclose a gross interference at these indicated places. For instance, in a case where the lingual surface of the maxillary canine is abnormally steep, and the patient is asked to move his mandible, with the teeth in contact, from centric to a lateral eccentric position, and as the cusps of the mandibular teeth move along the inclined planes of their antagonists for a distance commensurate with the lateral excursion employed by that patient, contact and pressure are felt only in the canine area, and a glaring separation is visible between the posteriors on the working side. With the entire weight of the occlusion bearing on the

[1] Read at a meeting of the American Dental Society of London, October, 1946.

canines, resistance of the supporting structures about these traumatised teeth can be sufficiently reduced to give rise to a traumatic crescent or marked recession. These signs are well defined and demand attention. Even conservative, remedial grinding of the offending tooth by the relatively inexperienced operator will do much to alleviate or arrest this condition.

What about those patients who are asked to protrude their mandibles from the centric rest position all the way to the edge-to-edge relationship? Frequently, the only tooth found in contact with its opposite number is the central incisor. A few minutes of grinding with a small stone or disc at the expense of the maxillary tooth will change the picture to contact extending to at least another pair of anteriors and probably to all the incisors, both central and lateral. Here, function will be tremendously improved, coupled with a pleasing change in æsthetics.

The state of apathy and indifference to these conspicuous conditions is difficult to appreciate.

The second consideration is apropos the controversy which has arisen regarding the wisdom of encouraging dentists at large to grind the teeth of their patients in an effort to obtain balanced occlusions. In the past, some American periodontists have strongly disfavoured this policy. They felt that the responsibility was too great and that more harm than good would result from this universal participation. Today, with an increasing number of dental schools actively interested in teaching sound methods of diagnosis and treatment of the occlusal factor in periodontal disease, the prospect of a personnel completely untrained in this type of work is not as depressing as it was years ago. True, selective grinding is fraught with some danger, so, too, are other daily practices in dentistry. We must face up to the fact that a handful of periodontists can hardly cope with thousands of abnormal occlusions that are present in the mouths of our patients. It is high time that the profession as a whole assumed this responsibility.

Obviously, the general practitioner must sufficiently equip himself with an adequate knowledge of the *modus operandi* of a normal occlusion, the function of the temporomandibular joint, the diagnosis of occlusal disorders, and the techniques evolved for the co-ordination and equilibration of an abnormal occlusion. How much or how little to do will be governed by the operator's judgment, based on the experience gained in this work. Common sense as a guide should prevail at all times.

Another factor which has discouraged many a novice is the problem of the sceptical or apprehensive patient. Pioneers in this field recall their most trying years when they first undertook to grind the natural teeth of their patients. The immediate reaction to any attempts made at grinding was, " Won't my teeth decay if you grind them ? " We, the general practitioners, are the agents responsible for the dental education of our patients and their attitude towards any particular form of treatment. Approaching a patient with a dangerous-looking stone in the handpiece, and attempting to grind his teeth without so much as a word of explanation is *not* the recommended method of enlisting co-operation. Current prejudices and misconceptions can be successfully dispelled by a reasonable and confident explanation that the removal of the outermost layer of the enamel will still leave ample covering for the tooth. Also, a simplified version of the story of occlusal disturbances and their sequelæ will promote a feeling of greater relaxation and assurance on the part of the patient.

Before undertaking the correction of an abnormal occlusion, it is essential that the normal condition be fully understood. Normal occlusion has been defined as the " normal relationship of the so-called occlusal inclined planes of the teeth, when the jaws are closed, accompanied by the correct proximal contacts and axial-positioning of all the teeth, and the normal growth, development, location and correlation of the associated tissues and parts " (Strang). Not only must the integrity of the individual tooth be considered, but we must regard the teeth as a combination which occludes and assumes the masticatory force.

Tissue Tolerance

It is common physiological knowledge that the stimulus of normal function is required for the proper development of any organ or tissue. Proper development means that the organ or tissue must have sufficient structural strength to function adequately without breaking down. Nature has a very elastic method of attaining this development. Unlike man-made machines, Nature's machines can develop additional structure and strength under the influence of beneficial stimuli. For example, alveolar bone will not only tolerate great pressure which is transmitted through the long axes of the teeth, but, in a favourable environment, will even increase by weight and by volume. Conversely, lateral pressure will induce destruction of the supporting bone structure.

The ideal occlusion is one which provides maximum function, hence maximum stimulation within the tolerance range of the tissues concerned. On the one hand, maximum function is required to chew our foods efficiently ; on the other, maximum stimulation is essential to build healthy, strong and resistant supporting tissues for the teeth.

The tolerance point of the underlying structures may be affected by many factors. For example, it

can be raised by controlling the functional stimulus (occlusal equilibration), by improving the bacterial or systemic environment, or it can be reduced by improper function, poor bacterial or systemic influences.

The occlusion of the teeth is chiefly responsible for the functional stimulation of the periodontal tissues. One tooth out of function for some time will not have the same tolerance as will one in normal function. A bridge abutment placed on a tooth that has not had an antagonist for a number of years is risky dentistry. Again, chronically infected tissues will not have the high tissue tolerance enjoyed by healthy tissues. These points must be considered before attempting occlusal adjustment. The purpose of occlusal equilibration is therefore to obtain and maintain a state of equilibrium between the forces of occlusion and the resistance of the periodontal tissues. The amount and quality of the support of each individual tooth must be carefully assessed by all the clinical and radiographic means on hand, before undertaking the task of a redistribution of occlusal forces.

Certain loads are placed on the teeth during mastication and are transmitted by the fibres of the periodontal membrane to the supporting tissues. Those considered most destructive are as follows:

Individual Loading.—Where one or two teeth carry the whole weight of occlusion, whereas it should be equally distributed over a larger number, the burden is too great on these isolated teeth, and some form of tissue destruction ensues. Correction involves the allocation of the load over more teeth.

Oblique Loading.—The conical shapes of the roots of the teeth, the architectural design of the alveolus, and the histological structure of the periodontal membrane, all seem to be planned with the idea of having the forces applied to the tooth equally distributed in all directions through the fibres of the periodontal membrane to the alveolar bone. This is what actually happens when the resultant forces are applied in an axial direction. If, however, these forces are directed obliquely or horizontally, tension and pressure are not equally distributed on the wall of the alveolus, but are concentrated at two points. This unequal dispersal of forces is responsible for pathological changes in the periodontium. By means of selective grinding, oblique loading can be reduced by shortening the planes and changing the angle of inclination of the offending tooth or teeth.

Impact Loading.—Linghorne maintains that forces that are produced as a result of a jar can also be injurious. Any movement that is stopped abruptly has a relatively high resultant force. This may easily exceed the tolerance range of the tissues. Impact loading is found in restricted lateral excursions where the lateral slide is suddenly arrested at centric position, and is not permitted uninterrupted passage towards the eccentric of the other side.

Individual, oblique and impact loadings are usually associated with trauma. Their correction may be considered the basis of occlusal equilibration.

Diagnosis

Some of the more obvious signs and symptoms of occlusal disharmony are as follows:

Symptoms.—(1) Pain in the teeth. (2) Soreness in the condyle region. (3) Cracking noise in the glenoid fossa. (4) Sensitive interdental papilla. (5) Inability to masticate properly. (6) Discomfort about the anterior teeth immediately after awakening due to bruxism, or undue pressure on the lingual surfaces of the maxillary incisors exerted by the tongue. Gratzinger has named this type of pathological function-dynamic irritation, a form of continuous irritation as opposed to intermittent trauma.

Signs.—(1) Traumatic crescents. (2) Mobility of teeth. (3) Pocket formation in isolated parts of the mouth. (4) Gingival recession. (5) Excessively worn teeth. (6) Enlarged veins in muco-buccal or muco-labial folds. (7) In a radiographic examination, the presence of isolated areas of vertical resorption in an otherwise uniformly-high bone line. This picture is particularly diagnostic of centric occlusion interferences.

Examination of the Patient

Examination of the patient consists of a study of the following conditions:

(1) Number of teeth in situ. The fewer the teeth, the more difficult the condition and the poorer the prognosis.

(2) The response to palpation and percussion of the teeth through the gingival tissues during the various occlusal movements.

(3) Reaction of the supporting tissues to functional stimuli. If the latter are unfavourable, typical, diagnostic signs will be invariably present.

(4) The degree of overbite and overjet.

(5) The direction and extent of stresses.

(6) The patient's centric relationship, and the lateral and protrusive excursions.

Observations, numbers (1), (2) and (3), require no further explanation. The degree of overbite, and overjet, particularly the overbite, should be carefully examined and measured. Williams, of Toronto, has suggested a classification of overbite determination which can be used as an additional guide in occlusal equilibration. Frequently, one is confronted with a case where the tell-tale evidence of traumatic occlusion is present. A closer inspection of the occlusion reveals a very deep overbite measuring somewhere in the vicinity of

6 mm. Should adjustment be attempted, or would it be best not to interfere by grinding? The following classification has simplified many problems of this kind.

Overbite Classification

Normal.—Zero–1½ mm. of overbite, when associated with compensating normal natural wear, overjet, inclination of the incisors and the cusps of the posteriors, and the curve of Spee.

Slightly Abnormal Overbite.—Zero–2 mm. of overbite, not compensated by the above-mentioned factors. Selective grinding finds its ideal application in this group.

Medium Abnormal Overbite.—2–4 mm. of overbite, not compensated by the above-mentioned factors. Occlusal equilibration by grinding alone will frequently secure much improvement for lateral movement, and slight improvement for protrusive function. If absolute correction is desired in this group, orthodontic and prosthetic measures followed by selective grinding are indicated.

Marked Abnormal Overbite.—6 mm. or more of overbite. These cases are usually beyond compensation by natural wear, inclination of the incisors and the cusps of the posteriors, and the curve of Spee. Correction by grinding is of little value in this group. Some compensation, not apparent, may have taken place, and any interference by grinding may be harmful. In this group, orthodontics is suggested for the young, and opening the bite by prosthetic means for the adult, free-way space permitting.

Number (5) in the examination, the patient is asked to chew up a piece of gum, bread or soft wax. He is then instructed to go through a natural, chewing movement, first on one side then on the other. In each case the operator will observe :

(*a*) The direction of the movement of mastication and the length of the chewing path.

(*b*) The starting point of the working stroke, i.e. where the teeth first make contact in the lateral excursion.

(*c*) The end of the working stroke, i.e. where the teeth disengage in the same movement.

In number (6) of the examination, the mechanism of occlusion is observed.

The Mechanism of Occlusion

The two phases of occlusion are the static, which is the centric relationship, and the dynamic, which is identified with the lateral and protrusive movements employed in mastication.

The Static Phase.—According to McLean, centric occlusion is not a tooth-to-tooth or denture-to-denture relationship. It is a mandible-to-skull relationship, and is dependent on the temporo-mandibular joints. Centric position is the key station of all occlusal movements, and it is from this position that lateral movements can be initiated.

McLean has this to say of derangement of centric occlusion, " . . . derangement of centric relationship and derangement of excursive relationships. Of these two, the first is the more deadly, for a simple reason. In excursive derangements, the force directed upon the interfering teeth is lateral. The tooth is driven against the side wall of the socket. This part of the lamina dura is strongly braced against the nearby buccal or lingual cortical plate of the jaw. Cortical bone must change to 'shell' bone, to Haversian system bone, to cancellous bone, then to spongy bone, which ' melts ' away. Cancellous bone is much nearer the melting point to start with."

In examining a patient's centric occlusion, it is essential to discover whether the teeth of one jaw contact their antagonists simultaneously. With a little practice, which tends to relax the masticating musculature, the average patient will close lightly at centric without difficulty. Tapping the chin lightly will encourage relaxation. He is then asked to close and stop at the feel of first contact. If, when asked to close harder, nothing happens, it can be assumed that contact is synchronous. If, on the other hand, premature contact occurs at one or two places, and the teeth have to slide a little before finally settling into the static centric position, the diagnosis is obviously one of centric interference.

These acquired centric occlusions can be very injurious. The most common causes are :

The pressure of third molars, pushing other teeth into interfering positions.

The overeruption of a third molar or other tooth into a vacant space in the opposite jaw.

High restorations.

In treating these conditions, carbon paper or a double layer of uniformly-soft wax is inserted on both sides, and the premature contacts are recorded. McLean has found that these contacts will be present on the distal slopes of the mandibular ridges and cusps, and on the mesial slopes of the maxillary ones. He recommends the removal by selective grinding of the cusp-peak portion of each distally sloping carbon mark in the mandibular denture, and the mesial sloping mark in the maxillary denture. Maximum cutting is done at the expense of the peak of the cusp.

Other indications for grinding at the centric position are limited. When faced with the anterior open-bite condition where the jaws are gagged on one or two pairs of posteriors, one may feel justified in closing the maxillo-mandibular opening by grinding the few contacting teeth, and thus increase mastication medially. This is, of course, a compromise measure. Another indication is where the retention of several mobile teeth, usually anteriors, has been decided upon. Temporary disocclusion at centric is advisable.

Correction at centric position offers the choice of

grinding into the fossæ or the cusps of the opposing teeth. Clyde Schuyler supports the rule of grinding the cusp if it interferes in all movements, otherwise the fossa is relieved. In the anterior region, the incisal edges of the mandibular teeth may be ground if adjustment for the eccentric excursions has already been carried out. Otherwise, interferences in the lateral movements will continue to traumatise these loose teeth.

The Dynamic Phase.—The masticatory apparatus was designed to bite off or cut, crush and chew our foods. The incisors are the cutting teeth, the premolars—the crushers, and the molars—the chewers. Today, due to our soft and refined diet, the crushing function is unnecessary. As a result, we are concerned primarily with the protrusive and the right and left lateral movements.

The usual chewing movement occurs when the mandible drops and moves over to one of the eccentric positions, then slides back towards centric position. The working stroke is from eccentric to centric. One patient may chew his food quite normally, first on one side and then on the other, moving his jaw either way, within the bounds of the functioning side. Another may utilise one side of the mouth only, and always move his jaw in the one direction. Other examples are found in locked bites where the direction is practically vertical and the movement is more of a chop than a slide ; or in cross-bites, where the direction of the movement is always the same, independent of the functioning side.

The protrusive movement occurs when the mandible is dropped slightly and moved forward to the protrusive position and is then slid back to the centric position, the mandibular teeth cutting against the maxillary ones.

The Shearing Stroke in Lateral Excursions.—In the examination of the lateral excursions, the patient closes in centric position, and with his teeth slightly in contact, slowly moves the mandible in a strictly lateral direction for a distance of approximately 3 mm. This measured distance is purely empirical, representing the average range of modern mastication. This procedure is repeated for right and left sides. To aid the patient in making this excursion, a finger is placed in the first premolar region, and he is asked to move his jaw in the desired direction. In poorly co-ordinated cases, a slight finger pressure on the chin will help considerably.

The ideal occlusion will show equal contact and pressure from the first premolar to the last remaining molar, moving from centric position to the terminal lateral position on the working side, and equal contact on the non-functioning or balancing side. Unfortunately, the average product of this modern age does not fit into this category. Due to interference from canine, lateral incisor or first premolar on the working side, and from molars on the balancing side, most posterior teeth on the working side are separated by distances varying from ·5–6 mm. In extreme posterior openings of obviously locked bites, selective grinding is not recommended as a means of improving the occlusal relationship. The more simple cases are the ones that lend themselves to correction by grinding. No hard and fast rule can be given to indicate the necessity for grinding, but a careful analysis of Williams' classification of overbite will be a valuable aid in making a diagnosis and dictating treatment. The ultimate goal at this stage is an occlusion which embodies a lateral excursion free of interference, equality of contact and loading of the posterior teeth on the working side, compatible with the tolerance threshold of the supporting tissues about the teeth, and, finally, a facile and harmonious slide of the antagonising tooth surfaces, continuously in contact, travelling from the eccentric position on the working side, past centric towards the eccentric position on the balancing side. It must be emphasised that the slide should not halt at the centric position, as so many excursions do, but should continue past centric if only for a distance of 1 mm.

Although tremendous improvement can be obtained on the working side by corrective grinding, ambitious efforts to co-ordinate the balancing and the working sides must be discouraged. In many cases, securing bilateral contact by selective grinding is not practicable, even if it is possible. It is generally contended that Man is a unilateral chewer, i.e. that he chews his food on one side at a time only. The acceptance of this theory, coupled with the fact that the entry of the bolus on the working side prevents complete closure on the inactive side, minimises the importance of bilateral contact in lateral excursions. One or two balancing contacts are quite sufficient. In complete artificial dentures, intercuspation and even pressure throughout right and left lateral excursions, both on the working and balancing sides, are essential to prevent displacement. This hardly applies to the natural dentition.

It is most important that steps taken to equilibrate the lateral and the protrusive movements should not mutilate the contacts of the established centric occlusion. Articulating paper of two different colours is used to preserve this relationship throughout the mouth and thereby maintain the maxillo-mandibular opening—one colour to record centric position and the other to register lateral or protrusive relationships.

In the evaluation of masticating stresses and strains, and the tolerance of the supporting structures, it may be found that one individual tooth has lost a considerable amount of bony support, and that its usefulness as a normal functioning member of the mouth has been impaired. Some adjustment

by selective grinding is indicated in such a case. The loading on this weakened tooth must conform with the support provided by its foundations. Curtailment of function means a reduction of contact. There are three types of tooth-to-tooth contact: Surface or broad contact, line contact, and point contact. If carbon paper registration shows up as a broad marking, it can be reduced to a narrow line or even to a point, depending on the amount and type of remaining support. This adjustment of the chewing path will reduce severe leverage and promote a greater tendency towards axial loading.

The Protrusive or Incising Stroke.—Ideally, when the mandible protrudes to an edge-to-edge bite, all the mandibular teeth should make contact with their maxillary antagonists. This condition is rare. The vast majority of dentitions show posterior openings ranging from 1–6 mm. in this relationship. It is obvious that absolute correction by selective grinding is not feasible in some cases. Practicable treatment will consist of the equilibration of the anterior segment of the mouth. As it has already been pointed out, when the central incisors are the only teeth in contact in protrusive function, the inclusion of the lateral incisors will reduce overloading on the centrals by 50 per cent. This grinding for function will also improve the æsthetics of the anterior teeth.

At this stage it is advisable to obtain accurate study casts mounted on an anatomical articulator. A general outline of treatment can be planned with study casts on hand. Certainly, the beginner should never attempt extensive occlusal equilibration without a careful study of the models of the case. As a word of precaution, it must be remembered that even the most modern of adjustable articulators and the most carefully taken wax registrations are not exempt from a certain percentage of error. Therefore, it is essential that the findings from the articulated casts should be correlated with those in the mouth.

The Use of "Chewable" Abrasive Material

The use of a fine abrasive as a final step in occlusal equilibration is favoured in some quarters; in others, it is condemned as a pernicious agent, capable of disrupting centric occlusion and reducing the vertical dimension. Undoubtedly, the uncontrolled and careless use of an abrasive can be exceedingly dangerous. If it is a type of abrasive which the patient is asked to use at home, most explicit written instructions must be given.

A "chewable" material with a very fine incorporation of abrasive has been advocated by Linghorne, and has been used with considerable success. This material serves two purposes. Occasionally, minor inaccuracies in the form of "bumps" persist after equilibration has been completed. These can be rapidly eradicated by the use of the "chewable" gum. The average patient's sensory responses are very acute, and having been given the necessary information, he can be relied upon to use the gum intelligently. This procedure will produce smooth, uninterrupted movements.

The "chewable" material has also been employed as a means of increasing the length of the chewing path. As the maximum masticating force, expressed by that last push or rub, is developed slightly past the centric position, it is suggested that every attempt should be made to produce a lateral slide that travels past the centric position. This method will also help to eliminate impact loading resulting from sudden stops at centric. Although selective grinding will ensure an extended movement in excursive relationships, there can be no objection to a controlled "wearing-in" process being carried out by the patient himself.

The physiology of normal mastication includes the process of tooth wear. Unfortunately, the modern mouth is characterised by either too much or too little wear. In some, the morsal surfaces of many a 40-year old occlusion disclose no appreciable wear whatsoever; in others, immoderately-worn occlusal and incisal surfaces result in unfavourable loading, the loss of sluice ways, and food impactions. Both the insufficiently worn and the excessively worn occlusions can benefit by selective grinding.

The following points deserve re-consideration:

(1) *The Use of Carbon Paper.*—Old carbon markings should be erased prior to the taking of a new registration. Thin oiled carbon paper is used to avoid blurs and smudges. Registration should be taken bilaterally. Carbon marks go in pairs; each marking has a complementary one on the opposite jaw. They should be considered together. Carbon paper registration confirms wax bite findings as well as the information elicited from the patient. These diagnostic aids, in conjunction with one another, simplify corrective measures.

(2) Equilibration of the contacts of one relationship must not disturb the established contacts of other relationships. Carbon marks of the fossæ, the peaks and the inclined planes of the lingual cusps of maxillary posteriors, and the peaks and the inclined planes of the buccal cusps of mandibular posteriors must be shunned during the equilibration of lateral and protrusive excursions.

(3) The out-dated slogan of "flatten the buccal cusps of the uppers and the lingual cusps of the lowers" should not be taken too literally. Although it is true that, for the greater part, the buccal aspects of the maxillary buccal cusps and the lingual aspects of the mandibular lingual cusps do not enter

into any important occlusal relationship, the ruthless grinding of these surfaces should be avoided.

(4) Facets must not be made during the grinding of tooth surfaces. The general anatomy of each tooth should be retained. The sharpness of cutting cusps and the depth of food exits must be secured.

(5) Only small carborundum or diamond stones are used to grind selective portions of carbon marks.

(6) The dominant tone in selective grinding is the retention of the maxillo-mandibular opening.

(7) Three to six monthly inspections are essential to check any possible supra-occlusion of the anteriors.

(8) The last step in the operation is a thorough polishing of all tooth surfaces which have been ground. Rough surfaces are never popular with the patient, but what is more important is that roughness in the contacting surfaces increases the coefficient of friction and can be injurious to the supporting tissues.

Conclusion

The diagnosis and treatment of periodontal disease should not be undertaken without seriously considering the occlusal factor. It can be assumed without reservation that occlusal derangement plays an important part in the ætiology of numerous periodontal conditions. Although it may be only contributory or an effect in some cases, it must still be reckoned with as a principal causative factor in others.

Occlusal equilibration must be a systematic procedure. It involves a thorough study of the normal picture and the individual formulation of a plan of treatment of the abnormal. No two cases are identical. Although dentists have been censored for under-grinding, over-grinding or not grinding at all, it is better, when in doubt, to do too little than too much.

Occlusal correction should be done in the child after orthodontic treatment has been completed. It has its place in all forms of restorative dentistry, and the operator may do well to equilibrate the occlusion of the remaining teeth, prior to the insertion of fixed and removable bridges as well as partial dentures.

Selective grinding is no panacea. It renders greater service as a preventive than as a curative agent. In this era of universal awareness of prevention, occlusal equilibration opens up a new field of endeavour in dentistry, and must be accepted as an integral part of dental practice.

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HYPNOTIC SUGGESTION IN DENTISTRY

By S. BARNETT, L.D.S.Belf.

Introductory

Among the many problems which dentists are called upon to face, the control of pain and of fear occupies an important position. The profession may rightfully claim a large measure of success in its solution. Anæsthetics, hypnotics, counter-irritants, and a host of other drugs, not to mention the all important chairside manner, have each brought a full measure of comfort to patients. It would be rash to assert, however, that our armamentarium was adequate in all cases. For most people dental treatment still is an ordeal of varying intensity. In my experience there are few dentists who will disagree with this statement ; and while this remains true we must not neglect to examine all reasonable aids to the lessening of our patients' discomfort.

Let us consider briefly examples of this problem in everyday practice. The use of local anæsthesia will usually eliminate the acute pain of cavity preparation, but the nervous patient will still grip tightly to the chair as the rotating bur vibrates through his whole being. Further, the mere insertion of the needle is sometimes too much for the patient. In this respect it is only necessary to mention the war veteran who will assert " I would sooner face a battle charge than have that needle stuck in me." The syncope which sometimes follows novocain injection presents a psychological, as well as a physical, problem.

The following occurrence will serve as an illustration of the problem :

A dentist injects novocain and allows sufficient time for anæsthesia prior to extraction. The tooth is removed very easily, and yet, though the

patient will admit afterwards that no pain was suffered, the actual extraction may be accompanied by manifestations of extreme mental discomfort. The immediate post-operative condition may well be no less unpleasant, the result being that a simple extraction may leave a patient in a nervous and worn-out condition for several hours.

I contend that the above description applies to a not inconsiderable minority of routine extraction cases, and variations of these reactions, ranging from slight to severe, are commonplace.

Can it be claimed with honesty that this is painless dentistry ? Only one with a very narrow and self-effacing definition of the word " pain " will answer in the affirmative.

It is the purpose of this article to illustrate how the use of hypnotic suggestion can ease the burden of treatment for both patient and dentist alike.

Suggestion as a Factor in Everyday Life

Cannon [1] has stated : " . . . Hypnotism is the production of a psychical condition in which the faculty of receiving impressions by suggestion and the power to act upon and carry out the suggestions is greatly increased. . . . The less the mind is occupied with ideas, the more easily can thoughts be directed into any given channel."

If the above statement is considered, it will be realised that hypnotism is used every day by many sections of the community. The successful salesman is an expert in certain spheres of hypnotism, and the orator, newspaper editor, physician and dentist, all realise the value of suggestion upon the human mind. Wookey [2] discussing suggestion on the conscious subject, writes . . .

" Unconsciously and consciously we all make use of it every day. . . . Certain it is, that we could all benefit by enlarging and developing its employment."

It is fully realised that many who have grown up to fear the term " hypnotism " would deny that they practise it, or that they are themselves the objects of such practice. I shall merely state that I believe this to be the case. There exists a largely arbitrary distinction between suggestions received in the conscious state, and those received in the so-called "hypnotic trance." Practical experience and a study of the relevant literature will, I believe, lead others to think likewise.

The Value of Relaxation

In dental practice one of the greatest psychological bugbears is the physical and mental tension which is present to a varying degree in all patients. Common signs of physical tension are the tightened fists, arched back, and breath-holding, met with either singly or combined. Mental tension is largely manifest by fear. Clinically these two conditions bear a definite direct relationship.

Reference has been made above to a common reaction of patients undergoing cavity preparation. Let us consider this further by the following example:

A large cavity in a lower molar is to be prepared. The patient's general attitude towards the treatment is that he must suffer pain and nervous tension. The purpose of a mandibular block is briefly explained, its pain killing effect being emphasised. The injection is given and anæsthesia attained. In a large number of cases this is sufficient to ensure a relaxed patient. There are, however, just as many cases where the mere sound and touch of the bur will cause the patient to " tighten up." Now the dentist has already gained a large measure of confidence by revealing an understanding of physical pain. He will add greatly to this by showing a deeper understanding of the patient's mental state. An explanation on the following lines, given after anæsthesia has been demonstrated, will do much to improve the patient's demeanour : " Now, Mr. . . ., that has quietened the actual pain of drilling, but I know that you still do not like the noise and vibration. I know, too, just what you expect your reactions to be. You expect to grip the chair tightly with your fingers, and hold your breath during each spell of drilling. That is what you think is going to happen. Now I shall tell you what you *will* do. You will breathe slowly and deeply throughout the treatment ; your fingers and your whole body will remain relaxed and loose. You will then find that the drilling affects you only slightly. It is your resistance to the stimulus which increases the effect upon you. If, however, you let yourself ' give,' the effect is then very small. A wise boxer doesn't resist a blow, but 'gives' with the blow. The idea here is just the same."

The whole bearing and speech of the dentist should be calm and deliberate. A study of hypnotic suggestion can increase tremendously the effect of the spoken word. There are, for example, ways of looking at the patient while speaking, as well as different methods of modulating the voice, which can turn a half-hearted chairside manner into one of balanced confidence. It is not proposed to deal here with the methods of learning hypnotism. Suffice to say that it requires study and a varying degree of practice after surgery hours.

Returning to our patient once more—when the cavity preparation is commenced, he is told to do as instructed while the bur is applied. The dentist points out, while drilling, that the whole attitude of the patient is one of relaxation and asserts that the noise and vibrations are not troubling at all. A reasonably co-operative patient will be impressed by his own demeanour. In order to increase further the patient's sense of well-being, the dentist may then remind him of the unpleasantness which he will suffer if he " resists." During one spell of drilling, therefore, the patient is instructed to hold his

breath and grip the chair hard. The unpleasantness of this procedure is then verbally emphasised by the operator. Invariably the patient is impressed by the difference in his reactions.

It may be argued, quite correctly, that the element of suggestion is present in the above procedure and that, for example, quiet breathing in itself does not cause the patient to feel better, whereas quiet breathing *plus* the effect of the dentist's suggestions will do so. The answer to this is that properly applied suggestion can and does intensify the effect of a physical process in the body. Without doubt the relative effects of physical relaxation and of suggestion vary with different individuals. The important thing, however, is the result obtained.

The above principles can be readily applied to the local anæsthetic injection technique. In many cases the patient's body and mind tense for the reception of a stimulus which is rarely as severe as anticipated. If, however, this elementary method of relaxation is applied, the patient's demeanour may well undergo a most happy and satisfying improvement.

The question may be asked " What happens if your suggestion fails ? Will confidence not therefore be decreased, and may the dentist not then appear slightly, shall we say, foolish ? " I would suggest that a beginner will be likely to encounter a few cases where he attempts too much, but with a little experience it becomes easy to recognise the good and the bad subjects. Most practitioners will agree that a fairly accurate analysis of a patient's " potential " is possible after the first few minutes of their initial visit. In any case, if during suggestion the patient is seen to be lacking in co-operation, it is a simple matter to state " No ! You are not co-operating very well. We shall leave it for to-day and go on with treatment in the usual way, but you should find that next time you may have a better idea." Let it be noted that the whole onus of failure (" *You* are not co-operating ") is placed upon the patient, the dentist's position will not therefore be affected. This method of breaking off in the middle of an induction by suggestion, when it is seen that success is unlikely, applies in the same way to later descriptions of sleep and reverie inductions on the same lines.

Application to General Anæsthesia

In the administration of inhalation anæsthetics such as nitrous oxide, the use of hypnotic suggestion can be of immense value. Marcuse [3] quotes Goldman in stating that :

" . . . Anæsthesia does not depend on gas-oxygen balance alone, but also on the patient's state of relaxation. . . ." He further quotes Goldman's advice to anæsthetists : " . . . Your voice has the suggestion of the hypnotist—it is calm, slow, suggesting sleep. The tone is more important than the content, at about the fifth to twelfth breath your voice takes on the character of a drone conducive to relaxation and comfortable sleep. . . ."

A good anæsthetist will soothe his patient before and during induction. This is no less important on the post-operative return to consciousness. In many cases a purely physical induction is reasonably satisfactory, but the nervous tension present in the majority of patients demands something more than the adjustment of the nosepiece and the terse instruction to breathe through the nose. In my opinion this nervous tension is an important cause of the so-called " excitement stage." The struggling and vomiting which may ensue during the early stages of anæsthesia can be correlated with certain nervous types of patients. We can often classify our patients after a few minutes, as being good or bad anæsthetic subjects from a psychological viewpoint. The physical condition must also be taken into account. The use of appropriate chemical hypnotics offers one solution to the problem. These factors do not, however, come within the scope of this paper.

It is my practice to use hypnotic suggestion as a routine factor in nitrous oxide administration. The general procedure is as follows.

If the patient appears nervous he is encouraged to admit it and not to conceal it in silence or artificial hilarity. The use of the words " You're feeling nervous, aren't you ? " does not, on casual consideration, affect the patient any more than to say " Are you feeling nervous ? " Nevertheless, there is a wealth of difference between these two sentences. In the first the anæsthetist has shown the patient that he understands the latter's feelings ; confidence being thus increased. In other words, the whole tone of the question impresses itself upon the patient's mind, not as a query but rather as a very definite statement " I know you are nervous. Admit it." In the second case the impression given is that the anæsthetist does *not* understand the patient's outlook, the effect upon confidence being correspondingly low. In simpler terms the comparison is this—in both cases sympathy has been demonstrated by the mere voicing of words bearing on the patient's nervous state ; but in the first case the patient will more readily think " This man knows what he is talking about."

This discussion on the choice of words applies equally to other circumstances in practice. The above deserves very careful consideration as it affords perhaps the simplest example of *deliberate* hypnotic suggestion.

Let us assume then that our patient has been encouraged to say " Yes, I am nervous. I'm scared stiff ! " He has, by giving vent to his feelings, allowed the escape of tension which might otherwise manifest itself during induction. There exists the

obvious comparison between two definite classes of people, (i) those who attempt to conceal emotion either by maintaining a forced silence or by affecting an attitude of unconcern ; and (ii) those who are readily moved to tears or laughter, that is, tend to "let go" their emotions. This latter type is usually a good patient, but let us beware of (i).

The next procedure is to assure the patient that he will find the onset of sleep pleasant ; that he will do exactly as instructed. It is then emphasised that there is an art in receiving an anæsthetic which few people appreciate. It is asserted "One person tries to gasp as much anæsthetic as possible in a very short time, in order to knock himself out ; the next person breathes as little as possible with the vague intention of resisting sleep. Both of these are very wrong. The correct way to take this is, first, to rest and let your mind go blank ; then just let yourself slip off to sleep. Take no notice of the thing being put over your nose, just breathe quietly and steadily ; rest ; forget everything. You will pass into a very pleasant sleep."

Administration is now commenced. The patient is instructed to fix his gaze on a bright object in front of him and to breathe quietly and deeply through the nose. "Rest. Let your mind go blank. Breathe quietly and deeply—quiet, deep breathing. Pay no attention to my words ; just rest." Pause. "That is excellent. Now your breathing is calm and deep. You are pleasantly at ease. Now I am placing the nosepiece in position. Take no notice of it, just rest quietly. Soon you will fade away pleasantly into sleep. Good, very good. Now you are beginning to feel warm and sleepy. It is very pleasant ; just let yourself fade away. Soon you will be fast asleep. Now you're fading away, pleasantly, pleasantly. Very good, sleep." The gases are, of course, administered concurrently with the suggestions. To those who have studied the induction of sleep by hypnotic suggestion, the resemblance between the above instructions and those of the hypnotist will be at once apparent.

When the patient is recovering consciousness, he is assured that the experience was quite pleasant and that he is perfectly well. The mind is highly receptive to suggestion in the twilight stage between consciousness and unconsciousness. Thus favourable or unfavourable suggestions given at this stage will have a corresponding effect.

Use of "Pseudo-anæsthetics"

If we consider once again Goldman's statement on the roughly inverse relationship between the patient's relaxation and the amount of anæsthetic required to induce a suitable degree of unconsciousness, it will be appreciated that the logical development of this state of affairs is that sleep can be induced by the mere inhalation of almost any vapour, provided that the patient believes it to have anæsthetic properties. In practice, a suitable patient can be shown a gauze mask with a few drops of, say, alcohol on it, instructed to relax and to let himself slip off to sleep by breathing in and out of the gauze, and unconsciousness will supervene. One great difference between this sleep and that produced by a real anæsthetic is that the patient is very amenable to suggestion by the operator (hypnotist). In this respect, too, it differs from natural sleep.

I frequently use various modifications of the above method. The procedure has been employed successfully for inducing relaxation, sleep, and various stages between consciousness and unconsciousness.

As an illustration of the state of mind and body which can be induced, the words of Hollander [4] are instructive. He stated :

"I do not attempt to get the patient to sleep, but to produce a passive concentration—without conscious effort or strain—so that the subject becomes unaware of his surroundings, pays no voluntary attention to his environment, and, as I shall demonstrate to you, very soon forgets that he has a body and limbs. His senses are quiescent, except for the direction that one or other is given by the operator, so as to concentrate the attention. The state produced is identical with the state of reverie, as, in hypnosis, there is such a concentration of mind that the external world is obliterated and neither things, persons nor events that are passing about one, are taken notice of, and what is of more importance the body is ignored, and any discomfort or pain that may have pre-existed is now negligible and not felt. This state is also akin to that of a man in ecstasy over his work, who, for the time being, is relieved from all his bodily woes, and may even forget his earthly needs. Moreover, he may feel no pain, as happened to Marini when writing his 'Adone,' when he did not notice a serious burn of his foot."

It has been found most satisfying to induce a state of reverie or sleep prior to injection of local anæsthetic and extraction. The effect of the drug can then be hastened by suggestion, and extraction performed almost immediately after injection. Suggestions are then made to ensure that the patient feels well on waking up, and, if necessary, to decrease or eliminate the discomfort of the healing process.

The following is a brief account of the procedure which I adopt to induce the hypnotic state[1] using a "pseudo-anæsthetic."

After a preliminary explanation of the benefits of relaxation, the patient is told that a cotton-wool roll soaked in chemical is about to be held close to his nose. He is told to let himself relax and not to

[1] It should be understood that the term "hypnotic state" is employed in a rather elastic sense as meaning any change in a patient's condition aided by deliberate suggestion. For example, hypnotic trance or sleep may not be attained, and indeed may not be advisable. The patient may be fully awake and yet be in the hypnotic state (e.g. swallowing a pill in whose action he has a tremendous faith). For the purpose of demonstration, the attainment of a condition of reverie is described, but the technique is similar for other degrees of hypnosis.

resist ; to breathe the chemical in and out quietly, and he will pass into a very pleasantly dreamy state. That he will not succeed in doing so if he resists. " Breathe in and out quietly. Don't fight me ; just let yourself go. You will feel your body growing pleasantly warm and sleepy. You will not go to sleep. You will just feel warm and dreamy, and you won't care about anything." Repetition is employed on the above lines, hypnotic reverie ensuing. Suggestion is now directed towards the actual treatment in view. For example, it is stated : " Now you are pleasantly far away and resting. You will remain that way for five minutes. I shall tell you when five minutes have elapsed. You will know everything that is being done, but nothing will bother you. You are pleasantly far away. Now I shall touch your cheek with a needle ; you will know I'm doing it, but it will not bother you at all." The cheek is then touched lightly with a sharp probe. " You see it didn't bother you. Now I'll do it again harder." The cheek is now jabbed hard with the needle, and absence of reaction emphasised. An injection may then be administered on the same lines.

When the patient has been roused, the operator points out the former's complete disregard for the treatment. It is further explained that his relaxation was the important factor in the process. That the chemical which he inhaled was not a true anæsthetic, although it had helped him to attain sleep. The general aim is to educate the patient to appreciate how relaxation itself produces the effect.

At a later stage, mutual co-operation may be sufficiently increased to allow the patient to pass into the required hypnotic state by merely instructing him to do so. The instruction " Relax " or " Sleep " will then ensure a fully co-operative patient.

The Time Factor

One objection which may be raised in any talk of hypnotism in dentistry, is the time factor. It is difficult to answer this in a paper, but practical experience will show that the time factor is not a real objection to the use of hypnotic suggestion, any more than it is in, say, the use of local anæsthesia for cavity preparation. For example, if the busy practitioner introduces the procedure into his everyday chairside manner, he may well find that he has previously employed twenty words where now ten words properly chosen carry much more weight. Later, when he has gained confidence in his own ability, he can extend its practice to other procedures, e.g. the control of anticipated sickness during the taking of upper impressions, control of sickness after novocain injection, induction of nitrous oxide anæsthesia, etc. The expenditure of time in these cases may well be relatively non-existent. Indeed valuable minutes may be saved.

There are, of course, those cases where the extra time consumed may appear excessive. Then the dentist must ask himself " Is it, on balance, worth it ? " The answer will vary with individual cases. For example, where extensive treatment necessitating several visits is contemplated on a rather nervous patient, five minutes or more of the first visit devoted to relaxation may mean the difference between a completely unco-operative subject and one reasonably amenable to treatment ; between good and bad dentistry ; between a dentist tired and worn out and a dentist with plenty in reserve for the next appointment. On the other hand, it is obviously unnecessary and useless to attempt any deep relaxation on the casual extraction patient who is not particularly worried over the prospect of treatment, being in too much haste to return to his office. In this case we simply get on with the job.

In contemplating this article it had been my original intention to devote the entire space to detailed reports of a few cases where fillings, extractions and scalings had been performed under hypnotic sleep. On further consideration it was realised the general attitude existing towards such reports. This attitude is closely akin to that held by the lay public towards sensational Press reports of miracles and cures attributed to hypnotism. In short, the effect upon the readers of the article would resemble the attitude of a theatre audience witnessing some elaborate conjuring trick. Thus it might be said " This is amazing ! But I'm afraid it is not for me." This course has therefore been avoided, and, instead, an attempt has been made to show that *deliberate* hypnotic suggestion is merely a scientific development of a good chairside manner ; that the study of hypnotism and intelligent application of its principles can afford the practitioner a very potent addition to his armamentarium. Most dentists will, from time to time, study literature on surgical procedure in order to improve their technique. The student must satisfy examiners that his scientific understanding of practical dentistry is adequate. We are, however, left to develop our psychological technique by practical experience alone. In this respect I would suggest that the final year student would do well to give himself a basic training in the science of hypnotism, as he is in perhaps the best position for study. It is barely possible that the subject will be included in the dental curricula of the future.

Hypnotism is not a cure-all. Like all other aids to dentistry, there are occasions when it is useless. As in all things, experience teaches us when to employ its use, and to what extent. Hypnotism is not magic, either white or black. It has a basis of sound common sense.

I am indebted to Mr. D. V. Gordon, L.D.S.Belf., for his helpful criticism and advice.

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[Practitioners are reminded that if they employ hypnosis or any measures inducing sleep or unconsciousness they would be well advised previously to obtain the consent of the patient (parent or guardian in the case of minors) in writing and to do this work only in the presence of a witness, female in the case of female patients.—EDITOR *B.D.J.*]

Correction: In the article "Progressive Asymmetry of the Mandible" by W. B. Balderston, in the issue of January 20, the passage on p. 25 "$\overline{5}$| occluded with 7|" should have read "5| occluded with $\overline{7}$|."

SHORT COMMUNICATIONS

A CASE OF CARCINOMA OF THE PALATE

BY E. K. TRATMAN, *O.B.E.*, M.D.S., F.D.S. R.C.S.ENG., F.S.A.

Case No. 2196/48. *Chinese* (Cantonese), female, aged 35.

The patient was referred for relief of pain in the right maxilla. She stated that the pain was due to the first permanent molar on the right side. Examination showed a large, hard, growth projecting from the palate on the right side, and extending across the mid-line and forwards to the level of the first premolar. Posteriorly, it extended on to the soft palate, which was partly fixed. The mass involved the alveolus and the tuberosity area and there was considerable limitation of movement of the mandible by reason of the bulk of the tumour preventing the normal movement of the mandible. The mass was partially pedunculated so that a flat blade could be passed between it and the palate to a depth anteriorly of more than a centimetre. The growth was more than 6 cm. long antero-posteriorly by 4 cm. wide and about 2 cm. thick. It was comparatively painless to manipulation, except round the first permanent molar, which was being exfoliated by the growth, and was loose. It was extracted before the model shown in fig. 1 was made. There were two areas of superficial ulceration as indicated by the slightly darker areas in fig. 1.

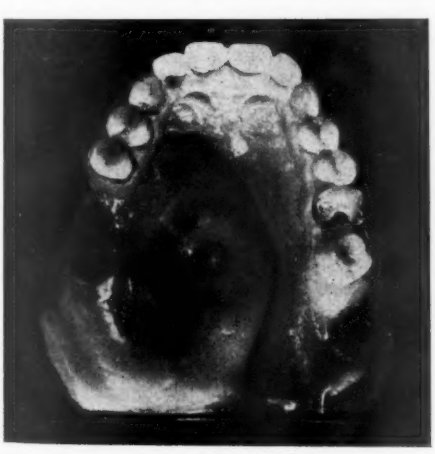

FIG. 1.—Palatal view of acrylic model of case. (¾ actual size.)

Subsequently a history of three years' duration of the growth was obtained. Lately it had been growing more rapidly. There were two old biopsy reports both reporting a squamous-celled carcinoma, but patient had twice refused operation. Operation was now not possible, and radium treatment was not available. The case had a fairly rapid fatal termination

The points of interest are the somewhat unusual site of the growth, for the palate is not one of the common sites of these lesions when they occur in the mouth, the comparatively long duration and slow growth, the long absence of any major degree of pain and the absence of ulceration. It would also seem that an increased degree of malignancy had accompanied the onset of pain. The partial pedunculation, as distinct from an everted margin, is less in extent than a case previously reported.[1]

[1] TRATMAN, E. K. (1935) *Brit. dent. J.*, **58**, 373.

A CASE OF AN OSTEOGENIC SARCOMA OF THE MAXILLA IN AN ANCIENT EGYPTIAN SKULL

BY N. SALAMA, L.D.S.ENG., AND AZIZ HILMY, L.D.S.ENG.
Dental Surgeons, Dental School, Cairo

DURING the excavations carried out in 1948 at the Pyramids District at Giza, Cairo, a collection of skulls were studied of which the following is of special dental interest. The skull is that of an ancient Egyptian from the 26th Dynasty which dates from 663–525 B.C., during the reign of Psammetichus I. The skull, that of an adult about the age of 30 years, showed a growth which had implicated the anterior part of the left maxilla, involving the orbit and infiltrating its floor, perforating through the pterygoid maxillary fossa. Anteriorly it had destroyed all the anterior surface of the left maxillary bone and part of the malar bone. Medially, the lower part of the ascending ramus of the maxilla was involved reaching to the inferior concha of the nose. The growth was mainly outside the left alveolar margin, and encroached on the outer plate opposite to |$\overline{34567}$. The teeth present showed an abscess cavity in relation to $\overline{6}$|. The upper left first molar—of which only the palatal root was remaining—had a perforating sinus in the palate. The upper right lateral incisor and upper left second and third molars showed marked attrition. The measurements of the skull showed that it was orthognathous. The facial angle was about 94 degrees and the dental index = 42, i.e. microdont (*see* figs. 1 and 2, p 102).

Radiographic Appearances.—Examination of a number of radiographs showed an extensive growth arising from the left zygomatic bone and almost completely destroying it. It had perforated into and partly destroyed the wall of the left antrum. The posterior part of the left alveolus was also infiltrated by it. The tumour presents a thin honeycombed appearance with a radiating peripheral margin with no signs of reaction around it. It is considered to be an osteogenic sarcoma (*see* figs. 3 and 4, p. 102).

FIG. 1.—Frontal view of skull and growth.

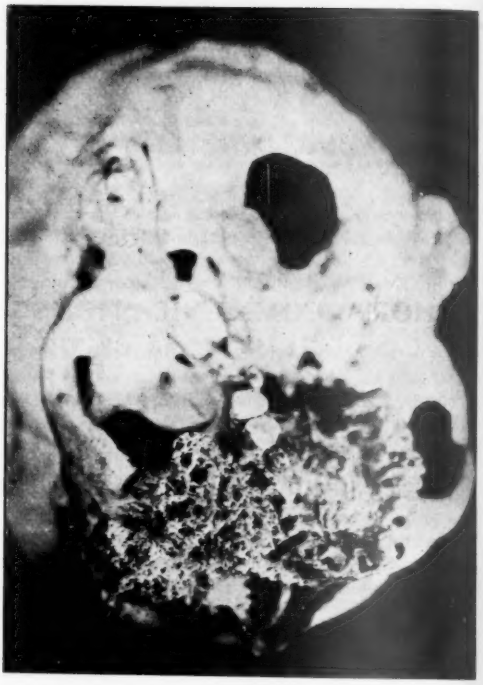

FIG. 2.—View of base of skull.

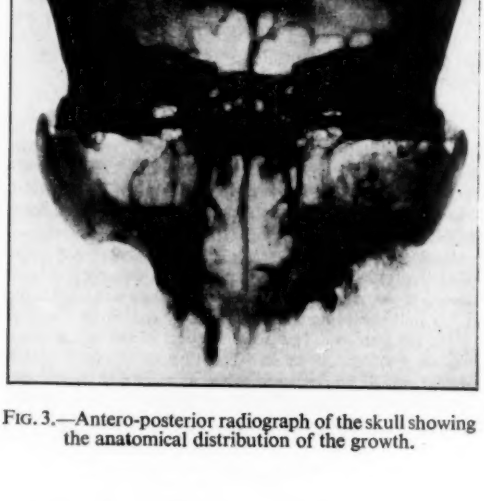

FIG. 3.—Antero-posterior radiograph of the skull showing the anatomical distribution of the growth.

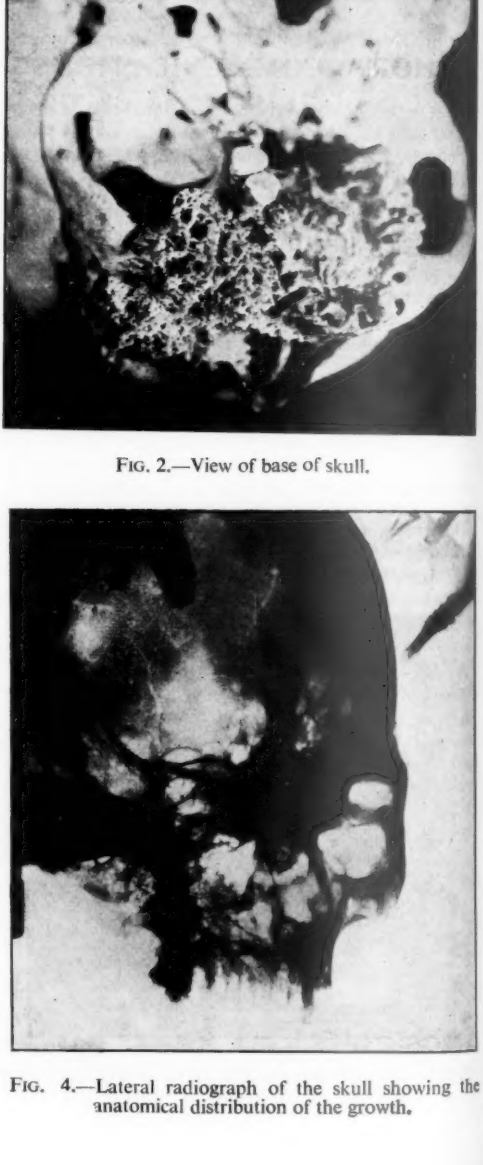

FIG. 4.—Lateral radiograph of the skull showing the anatomical distribution of the growth.

BRITISH DENTAL JOURNAL
FEBRUARY 17, 1950

SECTIONS

DENTAL Groups have been advised by the Central Committee of the Groups to disband and, where such action is appropriate, to apply to be constituted as sections of a branch of the British Dental Association. This advice is the logical outcome of amalgamation since, under the Articles and By-laws of the reconstitutioned Association, every member in Great Britain and Northern Ireland, is by virtue of his membership of the present body, also a member of one or other of its branches, each of which latter is empowered to authorise bodies of its members to form sections. The area of a section and the number of members included in it are matters to be decided by the section itself, subject to the approval of the branch and the Representative Board—both of which are almost automatic. It seems reasonable to assume that a very large majority of the members of Groups, and certainly all those who have been most active, are now members of the British Dental Association. This being the case the reconstitution of a Group as a section, or its fusion with an already established section of the Association, largely resolves itself into a matter of carrying out a few simple formalities. In theory, sections are not officially constituted until their formation has been approved by the Representative Board. In practice, however, so long as the rules of the proposed section are in harmony with those of the branch, this requirement need not involve any delay and the section can function at once on the assumption that the approval of the Board will be forthcoming in due course.

The rules of branches in relation to the formation of sections differ slightly, but broadly it can be said that if a Group or a number of members of a branch desire to be formed into a section they should make application to that effect to the honorary secretary of the branch and he will take the necessary steps to put their request before the council of the branch in proper form and to ensure that it is dealt with as speedily as is possible. The point to be noted here is that the initiative must come from the members who desire to be formed into a section. This follows the precedent of the formation of the branches in the early days of the Association and it is not unlikely that when the machinery is again reorganised history will repeat itself, and as the branches now cover the whole country, so in turn will each branch be divided into section areas. That is, however, a matter for future consideration in connection with the general reorganisation which the increase in the size of the Association has rendered necessary. The immediate need is for local action to anticipate any general rearrangement of areas and by the formation of sections to strengthen and improve the organisation of the branches and so of the Association as a whole. The necessary machinery is in being and the number of sections can be increased as rapidly as circumstances may require. In this connection it is encouraging to note that the Representative Board at their recent meeting sanctioned the formation of three new sections in the area of the Southern Counties Branch. Sections will necessarily vary very much in size. One in a thickly populated area may have a relatively large membership while, on the other hand, in districts where the population is more scattered, the size of the section will be governed to a great extent by considerations of transport. There can be, however, but few parts of the country in which the number of members of the Association is so small that it would not be possible for a section to provide its members with reasonable opportunities of meeting together. And that is the prime function of a section.

Opinions will differ on these questions of the number of members which should be included in a section and the area which it should cover, and, as was the case with the branches in the past, so now with their divisions, there is ample room for experiment and for diversity of treatment to meet differing local needs. What is important is not that a uniform plan should be applied to all areas but that in every branch steps should be taken to ensure that every member shall be able to take part in the activities of the reconstituted Association. Experience has already proved that an active section, because of the sense of professional solidarity which it promotes, is one of the best of recruiting agencies for the parent body. In the last analysis the strength of the Association depends upon

that of the branches and they in turn will come more and more to draw their strength from sections. The Group movement has performed a useful service by demonstrating the possibilities of united action by relatively small bodies of members. It is all to the good that the energies which have been enlisted to that end are now to be directed towards the extension and improvement of the local organisation of the Association.

NOTES AND COMMENTS

Disciplinary Procedure

IT is a principle of British law that a man cannot be tried twice for the same offence, in the case, however, of a dentist who is the subject of an enquiry by an Executive Council, or more especially the Tribunal, there may be elements in the case which might give rise to the question whether the name of the practitioner should be retained on the Register. It may also happen, as in a recent notorious case, that the offence is one in which the dentist is liable to be prosecuted under the criminal law. In the latter type of case it is clearly desirable that if a criminal charge is to be made it should be dealt with by the Courts before action is taken by any other body. This has been the practice of the Dental Board in the past and it will doubtless be continued. In the much wider range of cases in which criminal proceedings are not taken there are overlapping jurisdictions. Cases of false certification, for instance, give rise both to the question as to whether the offender should be debarred from taking part in the National Health Service and also to the further one whether his name ought not to be struck off the Register. A case of that kind is comparatively clear cut but it is easy to see that others might arise in which the Tribunal might properly decide that the retention of a practitioner's name on the dental list would be prejudicial to the efficiency of the General Dental Service, whereas the circumstances which gave rise to that finding would not justify the Board in removing his name from the Register, although they might conceivably form the subject of an enquiry by the Board. Since, therefore, two distinct issues are involved there would seem to be no escape from the necessity for two separate investigations, and as matters of professional honour may be raised before a Tribunal it is desirable that the Dental Board, as the custodians of the Register, should be officially informed of any disciplinary action which was taken as a result of such an enquiry. It further seems to be desirable, as has been suggested in correspondence between the Board and the Ministry of Health, that "certain categories of discipline cases which do not arise specially out of practitioners' activities as a National Health Service dentist should be heard in the first instance by the Board."

Another aspect of this same question has been raised in a leading article in the *Belfast Telegraph*, in connection with cases in which the General Health Services Board of Northern Ireland has ordered deductions to be made from the remuneration of dentists who have claimed payment for work which they had not carried out. The writer of the article insists that some at any rate of these cases should be made the subject of criminal charges. We have no data on which to form an opinion but we are confident that neither the distinguished laymen who are members of the Board nor their professional colleagues would have any desire to shield any dentist from criminal proceedings if they had reason to believe that he had acted wilfully with the intent of obtaining money under false pretences—their regard for the good name of the profession should be a sufficient guarantee of that. On the general question, however, as has already been said, it is desirable that if a criminal charge is to be preferred, the hearing of it should precede, and not follow, a hearing before either one of the disciplinary bodies set up under the Health Acts or the Dental Board.

Nuffield Fellowships and Scholarships

THE Nuffield Foundation, in pursuance of their aim of promoting the study of the fundamental problems of dental health and encouraging candidates of outstanding ability to take up an academic career in dentistry, is offering a number of Fellowships and Scholarships in dental and allied sciences. The Fellowships are of two kinds. The first are open to men and women with dental qualifications to enable them to receive additional training in pure and applied science to fit them for an academic career; the second kind are open to graduates in medicine and science to enable them to equip themselves to undertake dental teaching and research into the problems of dental health and disease. In addition to these Fellowships, a limited number of Scholarships are available for dental students of outstanding ability to enable them to devote one or two years to further study of the basic sciences. These Scholarships should be very attractive to students with a bent for teaching or research. Particulars of the Fellowships and Scholarships offered by the Foundation will be found in the advertisement columns of this issue.

The Institute of Dental Research, Sydney, Australia

THE Institute of Dental Research was started on a modest scale in January 1946. The Institute is an organisation with a considerable degree of autonomy but is closely related to and is accommodated within the United Dental Hospital, Sydney. Although its main purpose is to engage in research into dental problems a certain amount of routine pathological and bacteriological work is undertaken. In spite of the difficulty in acquiring equipment, financial difficulties and changes in staff, a number of fruitful investigations were carried out during the first two years of its existence. The accommodation of the Institute is severely overtaxed and in consequence extra-mural investigations are undertaken whenever possible. Surveys of the incidence of caries among children in schools and institutions have been made and several members of the Institute visited New Guinea and Papua in 1947 to take part in the Nutrition Survey of these territories. They have published a very interesting report on the dental conditions of the natives with particular emphasis on their oral bacteriology. Within the Institute itself investigations are being carried out on the mucin of saliva and biochemical and bacterial "diagnostic tests" for caries are being developed. The Institute has been extremely fortunate in its choice of Dr. N. E. Goldsworthy as its first Director. He has written an extremely interesting Second Annual Report, 1947–48, in which he does much more than report the work and achievements of the Institute. He has probed very shrewdly into the causes of the lack of research workers with dental qualifications and into some of the fundamental questions with which the dental profession of Australia, in common with that of this country, is confronted. One passage in his report is particularly worthy of quotation. "Dentistry now finds itself, largely of its own choosing, an autonomous profession, recognised as such by the parent profession of Medicine, and like a wayward child unjustly and unjustifiably more or less abandoned by that parent to its own devices. Organically this gulf between the two professions seems incapable of being closed, nor does it serve any good purpose to discuss further a situation which many deplore, the while despairing of its betterment. One result of this situation is that the autonomous profession of Dentistry lacks the more solid and more expansive base possessed by the Medical profession—a difficulty, of course, stemming directly from the different training within the respective faculties. The dental graduate's lack makes it inherently more difficult for him to appreciate the bearing of oral health and disease upon general health and disease and vice versa. Consequently he is worse equipped to undertake research, except in those branches of science which are at once peculiar to dentistry and are (as is only fitting) given particular emphasis during his training. This is not to be interpreted as meaning that the medical graduate is, *ipso facto*, more capable than the dental graduate of investigating dental problems. The medical student may indeed have had a wider training but he receives no systematic instruction in dentistry, such as he receives in other specialities like pædiatrics, ophthalmology or dermatology. As a consequence he remains more or less unaware of the scope of modern dental medicine and surgery and therefore is not in a position to appreciate the need for dental research or the magnitude, complexity and inherently interesting nature of the problems confronting dentistry today—all of which may help to explain the apparent apathy of the medical graduate towards dental research."

Mr. Donald Cox

MEMBERS of the Association will have learnt with regret that, acting on the orders of his doctors, Mr. S. Donald Cox, Assistant Secretary of the Association, is to take some months' sick leave. This announcement will not come altogether as a surprise to those who realise the immense burden of work which has fallen on Mr. Cox's shoulders during the past two years, accentuated as it has been during recent months by the multifarious detailed arrangements which had to be made in connection with the amalgamation of the three organisations. The comparative smoothness with which the transition has been effected is a tribute to the thoroughness with which Mr. Cox dealt with the many complicated matters involved in the amalgamation and members will wish him a speedy and complete recovery from the effects of the overstrain to which he has been subjected.

Fifty Years Ago

From the "Journal of the British Dental Association," February 15, 1900.

Therefore since then, if I ever had a suspicion that the patient was hæmorrhagic, I have invariably replaced the tooth after cutting off half or third of the root, and I have never had any trouble as a result. I do not think you need put an antiseptic of any kind into the sockets, and it is a safe way of producing a very healthy plug for the time being. By laying a small piece of cork on the tip of the tooth after it is replaced and bandaging the chin up for twenty-four hours you get perfect results. The tooth invariably gets loose after a short time and is removed by the fingers, but you do not get the disagreeable effects which I have found in other cases. I have used it several times and it has always proved efficacious.

From a speech by Mr. Beadnell Gill. Several other speakers also reported having used a similar method of controlling hæmorrhage.

LETTERS TO THE EDITOR

THE BENEVOLENT FUND

SIR,—It has occurred to me that the Benevolent Fund could be helped by asking that our guineas due to us on the reduced subscription by banker's order should be handed over direct to Mr. Heegard Warner. Also I do not think we should miss those rebates on insurances effected by the D.P.S. if they were transferred direct to that most deserving Fund.

Manor Road House,
Manor Road,
Beckenham, Kent.

Yours faithfully,
C. T. POMEROY.

SHORTAGES OF MATERIALS

SIR,—Last year there was a shortage of Zelex. Now it is Gypsogum that is in short supply. We have three dental companies in Leeds and none can offer any explanation.

Provisor Temporary Cement was taken off the market without warning and the only explanation given by the dental travellers was that it had been superseded by Kalsogen—which, as far as I am concerned may be an excellent cavity lining but has not the same remarkable property of setting rapidly in the face of a rising tide of saliva.

I do think that the manufacturers should consult the profession before completely eliminating well tried lines, and that their agents should be given some explanation of shortages and their probable duration, so that they no longer need to say " We don't know, they don't tell us."

17, *Chapel Street,*
Halton,
Leeds.

Yours faithfully,
J. R. STUART WHITE.

ADAPTATION TO EMBOUCHURE

SIR,—The orthodontic note of February 3 raises the thought that much too little attention seems to be given to the fact that teeth are important to bandsmen not only for eating, talking and appearance, but also for the playing of their instruments. Many musicians have to stop playing because they have lost their teeth. Still more are like the old flautist, who, whilst realising that his essential lower anteriors were affected by parodontal disease, was so afraid that dental treatment would render him incapable of earning his living that he would not go to a dentist at all. Yet all too often when a wind instrument player does seek dental advice he does not have consideration given to his special needs. The recent case of a National Health Service patient who complained that he could eat, but not play, with his new dentures is not the only instance.

On occasion it may be advisable to leave third molars standing and fit dentures that cannot be displaced backwards. Anterior teeth on partial dentures have to be set so that they support the lips suitably; and in these cases it should be remembered that some players—especially trumpet players—do not hold their instruments in the centre of the mouth. The appearance of such dentures is secondary. Players cannot always describe their " embouchure," and have seldom the knowledge of what dentistry can do to mar or maintain it. To enable a patient to retain an upper central killed by daily pressure from a trumpet, an apicectomy was followed up by casting a thin metal splint for use whilst playing, reaching back to the molars and covering most of the palatal surface of the upper anteriors.

In short, never treat a wind instrumentalist without having his instrument in the surgery.

Yours faithfully,
"POSAUNE."

REVIEWS AND ABSTRACTS

ORAL HISTOLOGY AND EMBRYOLOGY. Edited by Balint Orban, University of Illinois. Second Edition. London: Henry Kimpton, 1949. Figs. 265 and 4 colour plates, pp. 364. Price 56s.

The first edition of this book, published five years ago, has been recognised as a work of outstanding value and it is not surprising that a new edition has been required. It consists of the contributions of seventeen authors working in co-operation with the editor and each other and reaching a high level of agreement. A result of this plan is that the reader is not unduly perplexed by alternative explanations although debatable points are indicated ; and the illustrations gathered from so wide a field reach a standard which can scarcely be surpassed.

In the new edition various improvements, amendments and additions have been made without much increasing the length of the volume. One of the most important is the inclusion of a substantial account of the mechanism of tooth eruption based on the work of Sicher. Another is the addition of electron photomicrographs of shadowed replicas of dental tissues. Some of these will mean little to the student, and indeed their interpretation is still incomplete, but the electron photomicrograph of submicroscopic crystals of enamel enlarged twenty-three thousand times is certainly impressive. There has been considerable re-writing in detail as well as improvement in arrangement. It is perhaps a little surprising that an opinion that the destruction of periodontal fibres occurs by enzyme action caused by proliferating epithelial cells should appear unsupported by reference to any published work, even though it follows a sentence in which lack of agreement on the whole question is indicated. But in general references from the text to original articles or more complete discussions are sufficiently provided and well chosen.

Practitioners working for higher examinations will find this an ideal book. Those who are not will nevertheless find very much that is of value to them: in the sections headed "Clinical Considerations" at the end of each chapter the practical significance of the histological features described is discussed. If they have not been in touch with the subject of dental histology since their student days they may well be surprised to learn how much is now understood of the mechanisms of develop-

ment and the significance of appearances which formerly were recognised rather than interpreted. Students for qualifying examinations will find this a very desirable though expensive book, but should know that comparative dental anatomy is not included in its scope. It is not, however, confined to the dental tissues and has excellent sections on the histology of the mucosa, tongue, glands, and temporomandibular joint which are often omitted in dental textbooks and not easy to find in sufficient detail elsewhere.

NOTES ON THE THEORY OF DENTAL SURGERY. First Edition. By Norman Black, L.D.S. R.C.S.Eng. Late Lecturer and Examiner in Dental Surgery and Pathology, Dundee Dental School (University of St. Andrews). Staples Press Ltd., London and New York, 1949. Pp. 168. Price 12s. 6d.

The reviewer has a great deal of sympathy with the motive of the author who, drawing largely upon his own very lengthy experience, has set out to help the student by writing a short book outlining briefly the answers to the everyday problems of dentistry. Nevertheless he feels bound to say that in his opinion the book does not succeed in its object.

As the author implies in his foreword the book is based largely upon lectures given to students some years ago and some of the matter bears the imprint of this origin, being hardly current teaching. For instance, the figures quoted for the incidence of caries among schoolchildren are those of the B.D.A. investigation of 1896. One may look in vain for any reference to penicillin or even to sulphonamide therapy.

Pressure anæsthesia and the devitalisation of the pulp by means of arsenic are not favoured by most present-day authorities, nor would many physicians approve of the statement that tonic treatment helps considerably to produce a satisfactory result in anæmia. It is doubtful if the best interests of the patient are served by holding strictly to the high ethical principle of refusing to prescribe proprietary remedies and therefore giving a prescription for a tooth powder containing creta precip. and mag. carb. powder of unknown and variable abrasive quality.

Those interested in tooth bleaching will find this subject fully and very clearly explained. It is interesting to read the story of erythrophlein hydrochloride which was prepared from the bark of the Sassy tree of West Africa and was at one time widely used for pulp devitalisation but, with what some antagonists of root-canal therapy would regard as apt analogy, was also used by the natives for judicial murder. In consequence the wholesale destruction of the trees was ordered by the government and erythrophlein hydrochloride has since been unobtainable.

There is an appendix of nineteen pages on the techniques of local anæsthesia.

Temporomandibular Arthrosis.—This is a review of a series of 94 cases of a disturbance of the temporomandibular joint which was diagnosed as a degenerative non-infective condition, arthrosis. Nearly half the cases were bilateral and females predominated. The majority of the patients were between the ages of 20 and 30. Direct and indirect mechanical injuries to the joint such as blows, forced yawning, repeated luxations, disturbances of the occlusion, and habitual clenching and grinding of the teeth, are regarded as ætiological factors. Pain, difficulty in mastication, clicking joints and reduction of mobility were the commonest symptoms. In only a few cases were there more remote symptoms such as neuralgia, headaches, disturbances of the ear, which are emphasised by American authorities. As a rule the patient first notices a repeated painless cracking in the joint ; later pain develops on mastication. This gradually increases and is accompanied by reduction in mobility, worse in the morning. These symptoms may increase until the limitation of opening is severe and the patient becomes emaciated. On physical examination a cracking in the joint is often heard. There may be tenderness to deep pressure over the joint. Deviation of the jaw to the affected side on opening is an important sign and the muscles of mastication on that side may be atrophied. Bilateral lesions are rarely of equal severity. Radiography often reveals irregularity in the contour of the articular surfaces, narrowing of the joint gap, and a sclerosis of the subchondral marginal zone. In many cases, however, the X-ray findings are normal. Patients should be examined by a dental surgeon who may discover dental factors which favour the production of an arthrosis and may be able to suggest conservative methods for their elimination. In the early stages the progress may be checked by restoring the occlusion to normal. Diathermy, short wave therapy or radio-therapy sometimes produce temporary relief. Where these measures fail or where there is a progressive limitation of movement, or frequent locking, or where the radiograph suggests irreparable changes in the joint, surgery is indicated. Approach is made by the post-auricular incision, and as a rule extirpation of the disc and severance of adhesions is performed, but in a few cases resection of the condyle has been necessary. In bilateral cases the two sides are operated upon separately, a considerable interval intervening. After a few days active movement is encouraged. 33 patients were operated upon in this way and most cases were symptom-free a year later.—FOGED, J. (1949) *Lancet*, **2**, 1209.

A New Naturally Occurring Amino-Acid.—Investigation of the amino-acids of *C. diphtheriæ* by paper chromatography showed that an acid hydrolysate of the water-insoluble portion of the micro-organism contained an unknown ninhydrin-reacting substance in addition to seventeen known amino-acids. On the phenol-collidine chromatogram this was placed between aspartic and glutamic acids. The unknown substance was isolated from the other constituents of the acid hydrolysate and obtained in the form of a white crystalline material which proved to be diaminopimelic acid, $COOH.CH(NH_2).(CH_2)_3.CH(NH_2).COOH$. The new amino-acid occurs mainly in the water-insoluble portion of the diphtheria bacillus, although a small amount is found also, with the other commonly occurring amino-acids, in ethanolic extracts of the cells. It is probable that the diaminopimelic acid is a constituent of the bacterial protein ; its concentration is of the same order as that of the other common amino-acids. Diaminopimelic acid may well prove, says the author, to be widely

distributed among bacteria, since a substance with similar properties has already been shown by other workers to be present in certain products of bacterial origin.—(1950) WORK, E., *Nature*, **165**, 74.

In view of recent work using paper chromatography for the identification of the substances present in hydrolysates of teeth, sound and carious, this report should be of as great interest to those engaged in this field as it will be to biochemists in general.

Treatment of Sensitive Cervical Areas of Teeth with Hot Oil Applications.—A number of different measures, not all without danger to the pulp, have been recommended for the treatment of sensitive cervical areas. Olive oil heated to boiling was applied to the sensitive areas on one side of the mouth only, by means of an orange wood point, in twenty patients complaining of generalised cervical sensitivity. The treatment was repeated daily, in some cases for fourteen days, until the sensitivity disappeared. Sensitivity disappeared, apparently permanently, in comparison with the untreated areas which remained sensitive. The treatment caused little discomfort and was not followed by any discoloration of the teeth.—MCKENZIE, J. S., and MANN, A. W. (1949) *Oral Surg.*, **2**, 1558.

Lukomski's Paste.—According to Seltzer, Lefkowitz and Bodecker sealed 18, 36 and 72 mg. of sodium fluoride in the teeth of dogs and humans. They found that the pulp reaction was according to the dose. With large doses there was complete pulp necrosis. 18 mg. produced a localised abscess in twenty-four hours, in seven days complete necrosis. Seltzer states it is no longer possible to regard dentine and pulp as separate entities, any interference with dentine will produce changes in the pulp. The dentine of newly erupted permanent teeth is more permeable and the pulps are larger than older teeth.—*J. Amer. dent. Assoc.* (1949) **39**, 148.

Surgical Correction of Prognathism of the Mandible.—The three primary indications for surgical correction of mandibular prognathism are (*a*) lack of articulation between upper and lower teeth, (*b*) interference with speech and mastication, (*c*) disharmonious physiognomy. In addition an ample number of teeth must be present to allow for post-operative immobilisation and fixation. The collaboration of the orthodontist is invaluable. In the opinion of these authors section through the lower part of the vertical ramus is the method of choice. This necessitates section of the inferior alveolar vessels and nerve but avoids injury to the facial nerve and provides the maximum movement of the mandible backwards. Fixation is achieved by means of arch wires ligated to every tooth in the mouth and in addition to a number of orthodontic bands cemented to the teeth, where possible, in order to give sufficient rigidity to the appliances. The ramus is divided by means of a Gigli saw, the only incisions being very small ones behind the ramus and on the cheek. Division of the bone is followed by a profuse flow of blood from the cut inferior alveolar vessels. This is controlled within three or four minutes by hot saline packs applied with pressure. The arch wires are secured with rubber bands which exert posterior traction. These rubber bands are replaced later by wires. Fixation should be maintained for at least ten weeks and during this time careful attention must be paid to oral hygiene. A series of 50 cases is reviewed and in no case was regeneration of the inferior alveolar nerve delayed more than twelve months ; in most cases sensation returned in a much shorter time.—WINTER, L., WINTER, R. E., and WINTER, L., Jn., (1949) *Oral Surg.*, **2**, 1506.

THE HEALTH SERVICE

DENTAL SERVICE COMMITTEE PROCEDURE

A WHOLE-DAY meeting took place at the Ministry of Health on Tuesday, February 7, when the proposals contained in the Association's memorandum were discussed in detail.

The Ministry appeared sympathetic to most of the Association's suggestions. In particular they agreed that there was need for the issue of a handbook of guidance to Local Executive Councils and their Service Committees, and that this handbook ought to contain advice on many of the points put forward by the Association. After consultation with the other professions concerned with these Regulations the Ministry will draw up the handbook and the Association will be given the opportunity to comment upon it and suggest alterations before it is issued.

THE TRIBUNAL

THE Minister of Health has appointed the following to the panel of dental practitioners from which the practitioner member of the Tribunal will be appointed :—

C. V. Armitage, F.D.S. R.C.S.Eng., L.D.S.Edin. ; L. C. Attkins, F.D.S. R.C.S.Eng. ; F. J. Ballard ; T. H. Flitcroft ; E. Houghton, F.D.S. R.C.S.Eng. ; J. A. T. Rowlett, L.D.S.Eng.

Dental News

DENTAL BOARD OF THE UNITED KINGDOM

Reports of Committees at the 57th Session

The Dental Health Education Committee reported that they had received reports from the Advisory Sub-Committee on Dental Health Education that the following material had been produced during the year at a total cost of £4,127 : four new posters ; a book of chairside charts ; a set of six nursery frieze pictures ; a filmstrip on the use of a toothbrush ; a set of six acrylic models of the upper and lower jaws ; and a pamphlet " Twenty Questions." In addition a dental exhibit had been prepared for inclusion in the Central Council for Health Education nation-wide exhibition.

They recommended that Mr. G. H. Leatherman be appointed to serve as the representative of the Board on the Central Council for Health Education.

The Committee had considered a request from the Oral Hygiene Exhibition Committee of the XI International Dental Congress to be held in London in 1952 that the Board should contribute towards the cost of producing a film showing the formation and eruption of the deciduous and permanent teeth and the development of the jaws from infancy to twelve years of age. They recommended that the Board should offer to contribute one-fifth of the cost of the production of such a film, their contribution not to exceed £1,000.

The Finance Committee had been requested to allocate a sum of £4,000 for expenditure on dental health education during 1950, such sum to include any expenditure on the film made to the order of the Oral Hygiene Exhibition Committee.

The Educational Grants Committee recommended : that The Queen's University, Belfast, be offered (1) a grant at the rate of £600 a year for a period of one year in aid of the salary of a whole-time Teacher of Dental Prosthetics who shall be a graduate or licentiate in dental surgery subject to the condition that a minimum salary of £1,200 a year be paid to the person holding the appointment ; and (2) a grant at the rate of £400 a year for a period of one year in aid of the salary of a half-time Tutor and Lecturer in Clinical Dental Surgery subject to the

condition that a minimum salary of £800 a year be paid to the person holding the appointment.

The Education and Research Committee recommended that a grant of £100 be offered to Mr. E. B. Brain towards the costs of research on which he is now engaged in the School of Dentistry, University of Birmingham.

The Finance Committee estimated that for the year 1949 the income of the Board would amount to £29,462 and their expenditure to £29,184, leaving a surplus of £278.

The committee recommended that the following allocations should be made for the year 1950 :—

(1) £4,500 to Educational Grants Committee for grants in aid of teaching, including the production of films and filmstrips ; and grants to students.

(2) £4,000 to the Dental Health Education Committee for dental health education.

(3) £2,500 to the Education and Research Committee for grants for research and for postgraduate dental education.

The Committee estimated that the receipts of the Board for the year 1950 would amount to £29,402 and the general expenses to £22,296. There should therefore be a balance of £7,106 towards the special expenditure of £11,000 recommended.

The Committee felt justified in recommending that the estimated deficit of £3,894 for 1950 should be met out of the unappropriated balance.

The reports and recommendations of the committees were approved and adopted by the Board.

RETROSPECTIVE PAYMENTS

THE Admiralty announce that claims for retrospective adjustment to National Health Insurance scales of payment for dental treatment afforded to Naval personnel between the dates December 3, 1946, and July 4, 1948, inclusive, should be forwarded to the Director of Navy Accounts (Branch 6), Foxhill, Bath. The following particulars will facilitate payment :—

(*a*) Dates of treatment
(*b*) Name of Officer (or Rating) with rank or official number
(*c*) Ship or Establishment, and
(*d*) Adjustment now claimed.

ROYAL COLLEGE OF SURGEONS OF ENGLAND

A SERIES of twenty-four lectures in General, Oral and Dental Surgery is being given at the Royal College of Surgeons of England at 5 p.m. and 6 p.m. on Mondays, Wednesdays and Fridays from February 20 to March 17. Fees for the course are £10 10s. except for Fellows and Members of the College, and Fellows and Licentiates in Dental Surgery who will be admitted on payment of £6 6s. A full syllabus of the course can be obtained on application to the Secretary, Faculty of Dental Surgery, Royal College of Surgeons, Lincoln's Inn Fields, London, W.C.2, to whom applications for tickets should be addressed.

CENTRAL COUNTIES DENTAL POST-GRADUATE COMMITTEE

A POST-GRADUATE course of six lectures in orthodontics will be held at the Dental Hospital, Great Charles Street, Birmingham 3, on Wednesdays between March 29 and May 10, 1950, at 2 p.m.

The lecturers will be Mr. A. Walpole Day, L.D.S., H.D.D., and Mrs. M. Davis, L.D.S.

Each lecture will be followed by a clinical demonstration.

The class will be limited to twelve. The fee for the course will be £6 6s. Applications together with the fee should be made to the secretary, Mr. R. O. Walker, 8, Chad Road, Edgbaston, Birmingham 15, from whom full particulars of the course can be obtained.

PRINCESS TSAHAI MEMORIAL HOSPITAL

Appeal for Dental Department

THE building of the Princess Tsahai Memorial Hospital in Addis Ababa is now completed. The hospital will commemorate the daughter of the Emperor Haile Selassie who, during her five years exile in this country, worked with great devotion in British hospitals, nursing through the blitz, to prepare herself for service in her own country. She returned to Ethiopia after it was liberated and carried on her nursing work there until her tragic death at the early age of twenty-three.

The dental department of the hospital will fill a long-felt want since it will provide facilities for dental treatment which have hitherto been lacking in Ethiopia—so much so that members of the foreign community in the capital have usually made the long journey to Cairo to obtain treatment, and there have been no facilities for the treatment of either in-patients or out-patients—a lack which has been particularly felt in regard to maternity cases and the care of children.

An appeal for funds to equip the dental department, signed by Messrs. W. Kelsey Fry, Duncan MacGregor and Dr. Evelyn Sprawson, has been sent to members of the profession in this country and it is hoped that this will meet with a generous response. Subscriptions should be sent to the Hon. Treasurers, Princess Tsahai Memorial Hospital, c/o Messrs. Gould and Prideaux, 88, Bishopsgate, London, E.C.2.

The hospital is staffed by British personnel and the equipment is British. £85,000 has already been raised towards the cost of the building and equipment and it is estimated that a further sum of £15,000 will be required to complete the equipment of the hospital, including that of the dental department.

PARLIAMENTARY CANDIDATES

THE names of two members of the dental profession are included in the list of candidates who have been nominated for election to Parliament. Mr. J. Chalmers is standing as the Conservative candidate for South Shields in opposition to the Home Secretary, the Right. Hon. J. Chuter Ede. At the last election Mr. Ede had a majority of 7,114 in a straight fight with a Liberal National opponent. At Wolverhampton, which has now only two Divisions, Mr. J. Baird (Labour) is standing for the North East Division. He represented Wolverhampton East in the old Parliament.

TESTIMONIAL TO
Messrs. F. J. Ballard, A. H. Condry and T. Flitcroft

THE Appeal for contributions to the above Fund has evidently given satisfaction to past members of the Incorporated Dental Society by enabling them to have the opportunity of paying tribute to the work of the above named. The subscriptions so far received total £1,405 11s. 6d.

Presentations are to be made at a Complimentary Dinner at the Dorchester Hotel, on Saturday, April 22, at 7 p.m. for 7.30 p.m. Tickets for the Dinner will be 30s. each, and it is hoped that as many of the contributors and past members as possible will be present to honour the three recipients.

The Committee will gladly welcome men friends of members.

Application for tickets should be made to the organising Secretary and Treasurer, Mr. W. A.

Mellish, 80, Ewell Road, Surbiton, Surrey, enclosing cheque for the number of tickets required. Early application for tickets is advised.

MR. A. P. HUSBAND

MR. A. P. HUSBAND, Chairman of the Council of the Association, who recently underwent an ophthalmic operation, is making satisfactory progress towards recovery. He has left the nursing home and is now able to read for short periods. It will, however, be some time before he will be able to resume the duties of his office.

The Schools

University of London.—The Senate of the University of London have appointed Mr. A. E. W. Miles, F.D.S. R.C.S.Eng., L.R.C.P.Lond., M.R.C.S.Eng., to be Professor of Dental Pathology at The London Hospital Medical College.

Examination Results

Royal Faculty of Physicians and Surgeons of Glasgow.—*Final L.D.S.*—D. Campbell, Agnes N. Carnegie, G. B. Crawford, F. Gilroy, A. O. Jamieson, J. J. McKenna, Mary E. MacKenzie, Fionna M. Oman, G. Reid, J. I. Stevenson.

The Services

EFFICIENCY DECORATION

MAJOR M. C. HART, R.A.D.C., has been awarded the Territorial Efficiency Decoration.

Obituary

EDWARD RALPH KING, Dip.Med.Dent.Suisse, D.M.D.U.Zurich

MR. E. R. KING of 80, Park Street, London and of Barnstaple, died suddenly at Barnstaple on January 24.

Born in Switzerland he qualified from the University of Zurich in 1920. After acting as assistant first to Dr. Dean of Lausanne and afterwards to Dr. Dawson Buckley in Nice, he established himself in private practice in the latter place where he built up an extensive clientele. When France collapsed in 1940, he escaped to England and set up practice in London and Barnstaple.

A correspondent writes: "I well remember him at many an international meeting. Debonair, gallant, amusing and the soul of hospitality. Always anxious for one to dine at his home and to be treated to some gustatory delight which he took great pride in preparing."

He leaves a widow and one son.

Clarence Albert Keall, L.D.S.Eng., died suddenly at Perranporth on November 30, 1949. He qualified in 1895 and joined the B.D.A. in 1899. Before his retirement Mr. Keall was in practice in Holland Park, London.

Births

BLANTHORNE.—On January 13, at British Station Hospital, Derna, M.E.L.F. 8, to Sheila, wife of Major K. C. Blanthorne, *M.B.E.*, R.A.D.C., a daughter.

BROWN.—On February 9, at Mill Road Hospital, Liverpool, to Sheila (*née* Smith), wife of John E. Brown, B.D.S.U.Liv., a daughter.

FORSYTH.—On February 2, 1950, at "Flaxwell," Headlands, Kettering, to Pamela (*née* Zambra) and William Forsyth, a sister for Colin, Sarah and Timothy.

FULLER.—On January 26, 1950, at Sanderstead, to Valerie (*née* Cox), wife of J. R. Fuller, L.D.S.Eng., a son (Hugh Dermott).

Marriage

WYER—SCOTSON.—On February 11, at St. Laurence Church, Middleton St. George, County Durham, Oswald Wyer, L.D.S., to Ellen Clark Scotson, S.R.N.

Death

MONK.—On Thursday, February 9, 1950, G. Percival Monk, L.D.S.Lpool, of Cardiff, passed away at St. Winifred's Nursing Home, Cardiff.

Our Diary

Wednesday, February 22.

Metropolitan Branch—Eastern Section.—"Ham Frith," Grove Park, Wanstead, E.11, 8 p.m. "Amalgam Fillings," J. Sturrock.

Friday, February 24.

Brighton and District Section.—Annual Dinner, The Dudley Hotel, Lansdowne Place, Hove, 7.15 p.m.

Reading and District Section.—10, Gun Street, Reading, 7.30 p.m. "Some Legal and Ethical Aspects of Dental Practice," Dr. A. R. French.

West Kent and District Section.—Wrotham Park Club, 8.15 p.m., preceded by Informal Dinner, 7.30 p.m. "Orthodontic Cases Treatable with Removable Appliances," K. Pringle.

Monday, February 27.

The Royal Society of Medicine—Section of Odontology.—1, Wimpole Street, W.1, 5.30 p.m. "Surgery and Prosthesis in the Correction of Facial Deformity," Rainsford Mowlem.

Tuesday, February 28.

Metropolitan Branch.—Eastman Dental Clinic, Gray's Inn Road, London, W.C.1, 7.30 p.m. "Cervical Facial Orthopædics," A. A. Nove.

Preston, Leyland and Chorley Section.—Starkie House, Starkie Street, Preston, 7 p.m. "Intra-Oral Incisions," H. Ackers.

Wednesday, March 1.

Metropolitan Branch—Finchley Sub-Section.—319, Ballards Lane, N.12, 8.30 p.m. "Aids to Chairside Practice," G. Leatherman.

Thursday, March 2.

Bournemouth and District Section.—Grand Hotel, Fir Vale Road, Bournemouth, 8 p.m., preceded by Informal Dinner, 6.30 for 7 p.m. "Osteopathy," H. S. Cooper.

The Birmingham Medical Institute—Section of Odontology.—154, Gt. Charles Street, Birmingham. "An Investigation into Dental Caries employing Filter Paper Partition Chromatography," H. F. Atkinson.

Friday, March 3.

Peterborough and District Section.—Great Northern Hotel, Peterborough. Dinner Meeting 7.15 p.m. Discussion opened by H. G. Hobdell, "The Progress of the Health Scheme" and "Amalgamation of the Associations."

Saturday, March 4.

Public Dental Officers' Group—Industrial Division.—4, Granville Place, W.1 (near Selfridges), 2.30 p.m.

Sunday, March 5.

Public Dental Officers' Group—Eastern Division.—Angel Hotel, Peterborough, 2.30 p.m.

Wednesday, March 8.

Oxford Section.—Radcliffe Committee Room, Oxford, 7.45 p.m. "Recent Advances in Operative Dental Surgery," Allan Thompson.

Thursday, March 9

Brighton and District Section.—Conjoint Meeting with Brighton Division, B.M.A., Bedford Hotel, Brighton, 8 p.m.

The University College Hospital Dental Society.—U.C.H. Medical School, University Street, London, W.C.1, 7.30 p.m. "Our Attributes," R. E. Rix.

Saturday, March 11.

Eastern Counties Branch.—13, Hill Street, Berkeley Square, London, W.1, 10.30 a.m., Business Meeting; 11 a.m., "The Future of the School and of the Priority Services," J. F. Pilbeam; 2.15 p.m., "The Reduction of After Pain in Minor Oral Surgery," Allan Thompson.

Friday and Saturday, March 17 *and* 18.

Southern Counties Branch.—13, Hill Street, Berkeley Square, London, W.1. Friday: Council. Saturday: 10.30 a.m., General Meeting; "Current Dental Affairs," H. Parker Buchanan. 2.15 p.m., "The Maintenance of Standards in the Practice of Conservative Dentistry," Gerald H. Leatherman.

BRITISH DENTAL JOURNAL

Communications with regard to editorial business should be addressed to THE EDITOR, *BRITISH DENTAL JOURNAL*, 13, Hill Street, Berkeley Square, London, W.1. Telephone: Grosvenor 2761. Telegrams: "Bridention," Audley, London.

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